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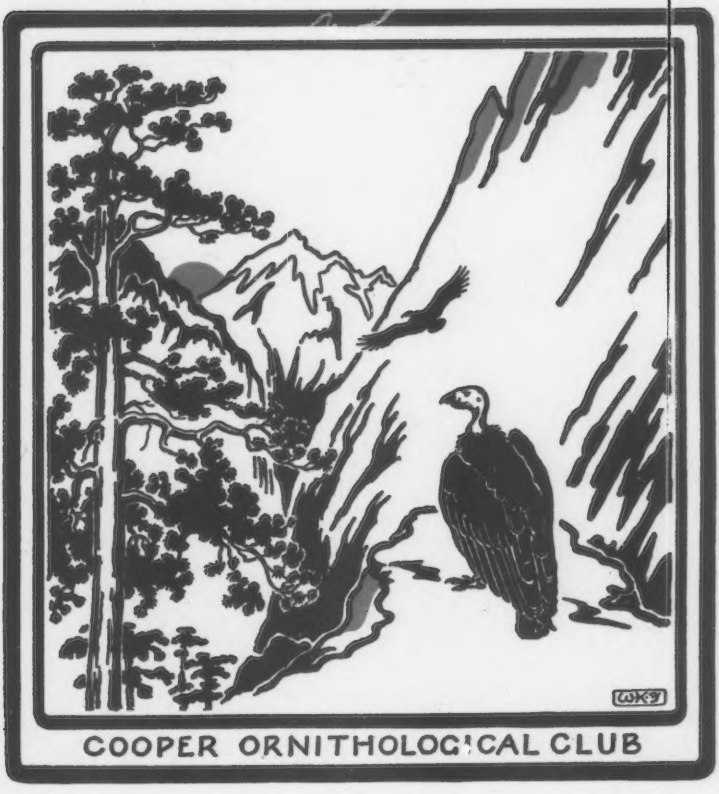
THE CONDOR

A Magazine of Western Ornithology

Volume 45 July-August, 1943 Number 4



COOPER ORNITHOLOGICAL CLUB

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A Magazine of Western Ornithology

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THE CONDOR

VOLUME 45 JULY-AUGUST, 1943 NUMBER 4

THE ALTA MIRA ORIOLE AND ITS NEST

By GEORGE MIKSCH SUTTON and OLIN SEWALL PETTINGILL, JR.

The Alta Mira Oriole (*Icterus gularis tamaulipensis*) is a conspicuous, orange, black and white bird of eastern Mexico's coastal plain. It frequently is seen along the highway from Laredo to Mexico City between Linares, Nuevo León, and Tamazunchale, San Luis Potosí. It is larger than the other common nesting orioles of this region, the Hooded (*Icterus cucullatus*) and the Black-headed (*Icterus graduacauda*), being fully nine inches long. Its song is loud and repetitious. It is especially notable for two reasons: (1) The male and female are so alike in size as well as color as to be virtually indistinguishable in the field, a resemblance that certainly is not characteristic of the Icteridae in general. (2) The nest is customarily placed in such an exposed situation as to suggest that the instinct for hiding it has been lost, or perhaps has been supplanted by an instinct for advertising it. This is hardly true of most orioles of the genus *Icterus*.

On and about Rancho Rinconada, headquarters of the Cornell University-Carleton College Expedition to southwestern Tamaulipas in 1941, we saw the Alta Mira Oriole many times daily throughout our stay (March 12 to May 4), became familiar with its songs and call notes, and discovered several nests. The birds began going about in pairs about the first of April, and nest-building started shortly thereafter (Sutton and Pettingill, 1942:29). A nest that Pettingill observed more or less regularly as it was being built was only about 75 yards from the house in which we lived. In the present paper this nest is designated as the "headquarters nest."

Building of the headquarters nest.—April 5. Shortly after sunrise, Pettingill chanced to see an oriole carrying long strands of nesting material into a living, though leafless, 50-foot-high ear tree (*Enterolobium cyclocarpum*) almost directly above him. The bird was so bright he thought it must be a male. It was not accompanied by a mate. Without a note of alarm or protest it flew to a two-tined fork not far from the end of a slender branch about 35 feet from the ground, rather carelessly deposited what it had brought, then, perhaps because the observer was so near, chattered once or twice, flicked its tail, and flew off.

Within five minutes it returned with another load, sang vigorously on reaching the tree, and went straight to the nest. It paid no attention to the observer, who now stood in plain sight about 50 feet from the base of the tree.

In the ensuing hour it made ten more visits. At each visit it sang before unloading and interrupted its work with brief, clear whistles. It brought the material to the fork proper. Here it stood on the nest-beginning, grasped with the tip of its bill the end of a sturdy rootlet, forced this "needle" downward past the twig, reached around and under to grasp the strand again, and pulled it up over the opposite side. At the end of the hour, work stopped abruptly. A tangle of rootlets and palmetto fibres now crudely entwined the crotch.

April 6. No one watched the oriole on this date. So far as could be determined from a cursory glance in the evening, no material had been added to the nest.

April 7. In mid-morning Pettingill watched the oriole (he assumed it to be the same bird) for half an hour. During this period it brought in three loads; but it took this material to a new two-tined fork, paying no attention to nest-beginning No. 1. It sang clearly before and during building periods and scolded a bit after work, just as it had on April 6. Nest-beginning No. 2 was only about six feet from nest-beginning No. 1; it was about 35 feet from the ground. By evening the two nest-beginnings were of about equal size.

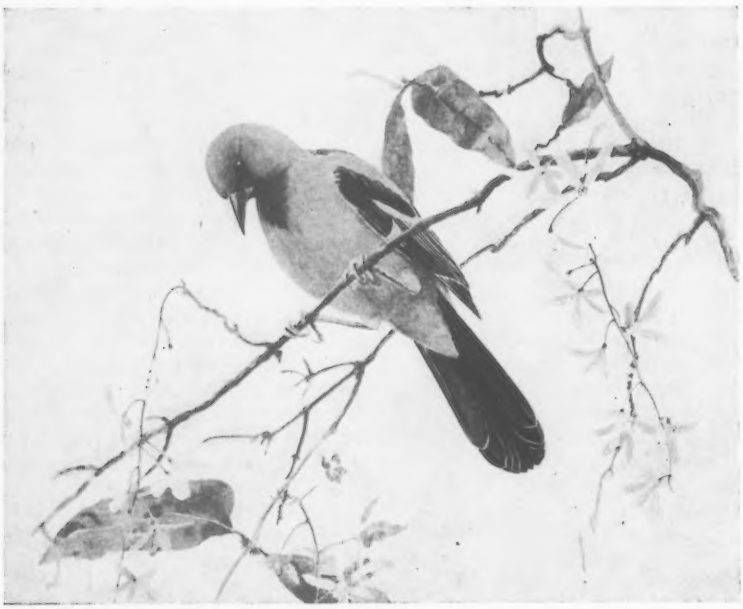

Fig. 32. Alta Mira Oriole (*Icterus gularis tamaulipensis*). A sketch in water color by George Miksch Sutton, drawn from a freshly-killed specimen taken near Rancho Rinconada, southwestern Tamaulipas, in April, 1941.

April 8 and 9. The oriole was seen and heard only infrequently on these days, it was not seen to bring in material, and, judged from the appearance of the two nest-beginnings, little or nothing had been added to either of them.

April 10. Early in the morning there was no oriole in or about the ear tree; but toward noon, on his return from the field, Pettingill found the bird hard at work and singing volubly at nest No. 2, which was now a shaggy mass a foot or more long. The original nest-beginning apparently had been abandoned.

In fifteen visits during the subsequent hour and a half, the bird occupied itself primarily with extending the nest-rim out from the fork. It wound strand after strand round one twig or the other, allowing many of the long, loose ends to dangle. Its movements were hurried and jerky. Occasionally it beat its wings to increase its pulling power. Not infrequently it lost track of the strand with which it was working, forcing one fiber downward past a twig but pulling another one up and over. It sang loudly and repeatedly, almost as though trying to call attention to itself or the nest.

By evening a thin sort of curtain, attached for about 8 inches along each twig, hung from the fork. Two-thirds of the nest's rim was thus outlined, if not completed. Only directly beneath the fork proper did the curtain appear to be tightly matted. The tree's lacy new leaves were now expanding rapidly.

April 11 to 13. Pettingill did not observe the oriole at work, but he noted that the "curtain" gradually became longer and appeared to be more tightly interwoven. The nest was still flat, however, rather than cylindrical or bag-shaped.

April 14. The curtain had "not much changed in appearance" when, with binoculars, it was inspected shortly after sunrise.

In mid-afternoon, however, the bird was working diligently at the remaining third of the rim. Now it straddled the fork as it added material to the curtain below it, and hung long, tough "cables" from one twig across to the other. These extra-heavy rootlets, which would support a mass of material similar to that borne by the twigs themselves, were attached with special care.

Often the oriole appeared to be standing on its head as, hanging by its toes, it tugged at one side of the curtain or the other. So firm was its toe-hold when grasping the nest's rim that it did not hesitate to stretch downward full-length. Occasionally it was thrown off its balance when a hard-pulled rootlet broke under the strain.

By evening the final third of the rim was virtually finished. From directly below, the nest now appeared to be a simple ring. It was not yet full length, by any means, being entirely open at the bottom. Viewed from the side, the recently completed part of the rim looked like a tiny hammock swung loosely between the two tines of the fork.

April 15. It rained, heavily throughout the morning, less heavily in the afternoon. All this time the oriole worked steadily, devoting its attention primarily to attaching strands to the new third of the rim, secondarily to strengthening the curtain just below the fork. Here its technique called to mind the "shuttle movements" of the nest-building Baltimore Oriole (*Icterus galbula*) as described by Herrick (1911: 359). All work was done *inside* the nest. When the bird hung downward, it did so invariably inside the rim. When it sought the dangling end of a rootlet it stuck its bill through the nest-wall and pulled the rootlet in. The curtain below the fork was now more than strong enough to support the active bird.

Pettingill noticed one striking change in the oriole's behavior: it was silent. Although diligent as usual, it did not sing as it approached the tree with material and when it reached the nest, it slipped quickly inside, as if in haste to be out of sight. Here its moving form could be made out faintly. It clung to the lengthening wall, probably straddling most of the time, tugging and poking at the pendant fringe at the bottom, working so hard that the whole nest, branch and all, frequently shook. Not once did it fly out from the bottom. Invariably it clambered to the rim and departed promptly without a chatter or whistle. The nest was now 15 to 18 inches long and shaggy at the bottom.

April 22. The nest was now full-length, rounded neatly at the bottom, but wholly without lining. Light could be seen plainly through the walls and bottom.

Toward noon Pettingill saw the oriole bring three loads of material. It popped into the nest, making its way quickly to the bottom. Here it set to work, presumably on the lining.

On its third trip it was followed by another oriole, almost certainly its mate. The new bird did not fly into the ear tree, but lingered close by. It was not noticeably brighter than the bird at the nest. The two called to each other until the first one entered the nest. Then the second flew off.

April 24. In mid-morning Pettingill watched at the nest long enough to see the

oriole bring two loads of material. Each time it stayed in the nest about ten minutes. Presumably it was at work on the lining. The "mate" was not seen.

April 29. The nest was visited several times, but neither oriole was seen.

May 3. The ear tree was now well leafed out. The nest was plainly visible 30 or 40 paces away, however, for the foliage was thin. At about 8 a.m. Robert B. Lea carefully collected the nest for us. It contained one egg, which proved to be fresh. We did not even see an oriole anywhere close by!

Fig. 33. The headquarters nest of the Alta Mira Oriole, photographed April 22, 1941, on the sixteenth day of building.

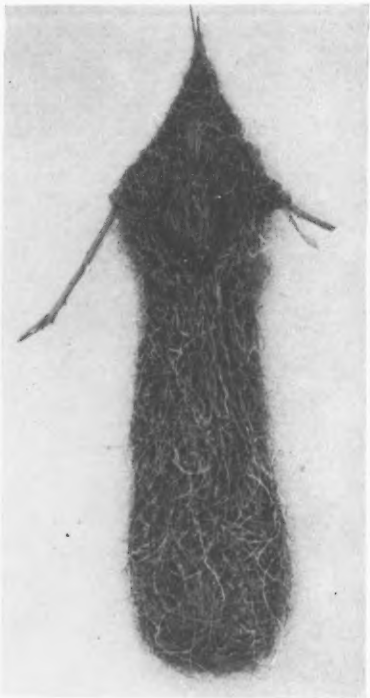

Fig. 34. The completely built headquarters nest after its removal from the ear tree.

Description of the nest.—The nest's greatest outside length, from the fork to the bottom, was 25 inches. The greatest outside diameter (not far from the bottom) was 6½ inches. It was symmetrical and quite smooth, the material being well tucked in. It was made almost entirely of air-plant rootlets, most of them several inches long, and fiber stripped from palmetto leaves. The lining, which covered the bottom only, was of palmetto fiber and horsehair. Nowhere about the nest was there a feather, bit of wool or cotton or kapok fluff, or other soft material.

About 250 strands of rootlet or palmetto fiber passed over each eight-inch length of supporting twig. The remaining third of the nest-rim consisted of four or five tough rootlet "cables" hung from one tine to the other. About these, slenderer rootlets were

twisted tightly, giving the edge a somewhat rope-like appearance. This third of the rim was notably thin and strong.

The rootlets of the nest wall ran downward more or less parallel to each other, as if they had purposely been allowed to dangle while the bird wove other strands about them. Some of these meridional rootlets extended the entire length of the nest, but most of the material was obviously woven in and out crosswise into a sort of rough fabric. No rootlet or fiber encircled the outside of the nest.

The wall was thickest at the bottom. Here the material was tightly interwoven and matted. The lining was not attached either to the bottom or to the sides. It could be lifted *en masse* without difficulty, evidently having been laid with some care and pressed into final position by the bird's body.

Discussion of the headquarters nest.—We are not sure that the same oriole built nest-beginnings 1 and 2. We believe that the completed nest was built by one bird only and that during most of the building period it was wholly unattended by a mate. We do not know the sex of the bird that did the building.

Building the nest required at least eighteen days (April 7-24) and possibly as many as twenty-six days (April 7-May 2). From April 7 to 14 the work progressed irregularly; from April 14 to 17 much material was added; from April 17 to 22 the structure took on its final shape; but from that date on, work was desultory. We believe the first egg was laid on May 2.

The trail nest.—Sutton discovered a partly built Alta Mira Oriole nest on April 6. It was almost directly above one of the paths leading from the Rio Sabinas to the main trail to Gomez Farias and was about 30 feet from the ground on a *dead* branch in a living tree at the edge of a good-sized clearing. Here *one* brightly colored bird was noted repeatedly, never two. This bird sang, brought nest material, scolded and drove off Brown Jays (*Psilorhinus morio*), and occasionally scolded the observer as he stood under the tree. We spent very little time observing this nest, but regard the bird's (or birds') choice of a dead branch as significant. Any number of apparently suitable living branches were available close by.

The river nest.—An Alta Mira Oriole nest overhung the Rio Sabinas not far from the Rancho. We found it on April 3, but we do not know how many birds worked at it. It was in a cypress and must have been fully 50 feet above the water. It was in plain sight for many rods both up and down stream and was not far (possibly 25 feet) from an occupied nest of the Rose-throated Becard (*Platypsaris aglaiae*) and one of the Giraud, or Social, Flycatcher (*Myiozetetes similis*).

The field nest.—This nest was far out on one of the uppermost branches of a large (50 feet high), *completely dead* tree that stood quite by itself in a well cleared field just north of the headquarters house. We saw a single bird at work building from time to time in the latter half of April. It brought material from the nearest woods. Here the trees were tall and well foliaged. Close to the nest, although on different branches, there were two nest-beginnings. We never saw two birds at the nest.

The Cañon de Galeana nest.—As we drove northward on May 4, we passed an Alta Mira Oriole nest that hung from a leafless, perhaps dead branch, almost over the main highway, about 30 feet from the ground, and not far from the highway marker calling attention to the canyon itself. The general impression was that this nest had been placed in the most exposed situation that could be found thereabouts.

The telephone wire nest at Tamazunchale.—Sutton has already reported on a nest seen by John B. Semple and him near Tamazunchale, San Luis Potosí (see Sutton and Burleigh, 1940:231). This nest was swung from a single telephone wire that ran above a wooded gully and was 80 or more feet from the ground. The poles were many rods off,

on ridges at either side of the gully. It would be hard to imagine anything in the line of birds' nests more visible than that nest was!

Nest of Icterus gularis in El Salvador.—Dickey and van Rossem (1938:526) call attention to the fact that nests of *Icterus gularis gularis* "are hung from telephone wires, particularly if there happen to be a few tufts of epiphitic growth to provide a starting point."

Advantages of an exposed nest site.—From data presented thus far it is obvious that the Alta Mira Oriole makes no attempt whatever to hide its nest. It is not unique among the icterids in this respect, although it apparently is the most northward ranging of what we may call the "nest-advertising orioles," and it definitely is not colonial. Relying to some extent on the strength and depth of the structure, it chooses a conspicuous site that is not readily accessible to quadrupeds and snakes and proceeds to fly directly back and forth, singing loudly as it builds. Whether an unmated bird may choose a conspicuous nest-site, start a nest, and actually attract a mate through its bright colors and loud singing is, of course, a moot question. For a time we were confident that the bird at work on the headquarters nest was an unmated male, but we doubt this now.

Certain it is that a conspicuous nest site is advantageous to the owner insofar as it forces enemy species to use exposed avenues of approach. How easy it is, when we focus attention on any one bird to forget that this bird's enemies all have enemies themselves! Any predatory creature that makes its way to an Alta Mira Oriole's nest, either by day or by night, is certain to expose itself to its own enemy species whether these happen to be enemy species of the oriole or not.

The oriole's nest must meet certain specifications if it is to be boldly advertised, of course. It must provide proper conditions of temperature and air for the eggs and young birds in spite of hanging, hour after hour, exposed to the sun. It must be tough enough, long enough, far enough out on the branch, and far enough above the ground to make a coati-mundi (*Nasua*) "think twice" before attempting a raid. It must be too deep for Brown Jays to rob easily, too tough to tear apart, too much like a trap to appeal to the female Red-eyed Cowbird (*Tangavius aeneus*). The fact that *Icterus gularis* is common proves it to be a successful species. We may believe, therefore, that its own peculiar method of nest-advertising is advantageous rather than otherwise.

Nidification of Icterus gularis and other orioles compared.—The nest of *Icterus gularis* is, like that of *I. pectoralis, I. sclateri,* and *Zarhynchus wagleri* deep and entirely pensile, without any support at the sides or bottom. That of *I. cucullatus* is pensile, but extremely shallow by comparison. The other orioles that breed in the United States (*I. galbula, I. bullockii, I. graduacauda, I. spurius,* and *I. parisorum*) all build semi-pensile nests.

Nests of *Icterus gularis* observed in El Salvador are 15 to 20 inches long (Dickey and van Rossem, 1938:526); our two nests from Tamaulipas, measuring 25 and 27 inches, were somewhat longer. Nests of *Icterus galbula* exhibit a similar variability in length, many specimens being 5 or 6 inches deep, some as much as 9 inches (Bendire, 1895:485). Nests of *Zarhynchus wagleri* range from 22 to 40 inches in length (Chapman, 1928: 146). *Icterus gularis* is not a very much larger bird than *I. galbula,* yet it builds a nest fully twice as deep.

The oriole (or orioles) at our headquarters took at least eighteen days and possibly as many as twenty-six days to finish the nest, less time, in other words, than the "about one month" required by the Wagler Oropendola of the Canal Zone (Chapman, 1928: 165). The Baltimore Oriole, which nests in more northerly latitudes where the breeding season is shorter (see Pettingill, 1942:94-95), takes only two to three days (Nauman,

1930:295), "about 4½ days" (Herrick, 1911:295), five to eight days (Hendire, 1895: 484), two to six days for "the external part" of the nest (Forbush, 1927:446), or as much as eleven or twelve days (Brewster, 1937:44).

We have shown that our Alta Mira Orioles did not work at all steadily. In this respect *Icterus gularis* must differ from *I. galbula,* for Herrick (1911:356-364) comments on the steadiness with which the Baltimore Oriole works, calling attention to the fact that building does not slow down perceptibly until the next to the last day. Wagler Oropendolas, according to Chapman (1928:140) "work regularly and persistently, giving the greater part of each day to their task" with "correspondingly little variation in the birds' working hours."

Among orioles in general it appears to be the rule for the female to build the nest, although she does not usually go about entirely unattended by her mate. This certainly is true of the Baltimore Oriole (Herrick, 1911:357; Forbush, 1927:444; *et al.*) and of other species of the genus *Icterus* in the United States, as well as of the Wagler Oropendola. Sutton has observed the Orchard Oriole repeatedly about his boyhood home at Fort Worth, Texas, and at Bethany, West Virginia from 1914 to 1941, and has seen the female secretively building, with the male singing boisterously not far away. As for the Hooded Oriole, we observed the building of two nests at Rancho Rinconada in the spring of 1941. In both instances the female did all the work, although the male frequently sang close by. Chapman (1928: 165) tells us that the male Wagler Oropendolas are "in constant attendance on the females whether as wooers or accepted mates until the eggs are laid."

In all species of the genus *Icterus* of the United States save one, the female (the nest builder) is much less brightly colored than the male and the nest is more or less hidden. The one exception is *I. graduacauda,* in which neither the male nor female is very bright and the nest is well hidden as a rule. How strikingly different is *Icterus gularis* in this respect! In this species the female is as brightly colored as the male and there is nothing in the least secretive about nest-building. The nest itself is to be advertised, so why not advertise the builder as well?

SUMMARY

1. Five occupied nests of the Alta Mira Oriole (*Icterus gularis tamaulipensis*) found in the spring of 1941 in the vicinity of the Rancho Rinconada, near Gomez Farias, Tamaulipas, were placed in much exposed situations. Nests of *Icterus gularis* reported from San Luis Potosí and El Salvador were placed in similarly exposed situations.

2. Alta Mira Orioles were not secretive in their building activities; they flew directly back and forth, singing loudly as they worked, giving a definite impression that they were calling attention to themselves and their nests. Never was more than one bird seen actually working at a nest at any one time, however.

3. The fact that the female Alta Mira Oriole is brightly colored suggests that there may be a definite correlation between exposure, or "advertising," of nest and brightness of nest-builder.

4. Exposure of nest and brightness of nest-builder is advantageous, or at least not disadvantageous, to *Icterus gularis* in that it forces enemy-species to expose themselves whenever they approach the nest; but the nest must be tough, well ventilated, deep, far from the ground or water, and far out from the main trunk (or telephone pole!) if it is to be so exposed.

5. The building of an Alta Mira Oriole nest required at least 18 and perhaps as many as 26 days. This is a much longer nest-building period than that of the Baltimore Oriole, whose breeding season is much shorter; it is not quite so long as that of the Wagler Oropendola, whose breeding season is probably longer.

6. The oriole, or orioles, that built the above-mentioned nest worked far less steadily than Baltimore Orioles or Wagler Oropendolas are reported to do.

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THE MOLTS OF YOUNG WILD AND DOMESTIC TURKEYS

By A. STARKER LEOPOLD

The molts and plumage sequences of many gallinaceous birds have by now been adequately described. Experiments with the domestic fowl have yielded some of our best information on the physiology of molt and feather growth. But the molts of turkeys (*Meleagris gallopavo*) have never been fully worked out, and since the family Meleagrididae is probably phylogenetically more or less isolated from other families in the order Galliformes, it is not surprising to find in turkeys certain peculiarities of molt which are not characteristic of the fowls in general. The main purpose of the present work is to describe the various molts and plumages of the young turkey from the time of hatching to the attainment of sexual maturity in the first winter. Notes on the annual and prenuptial molts of adult turkeys are added, but insufficient material is available to describe these in detail. In addition, within this species some differences in the molting procedures of young Eastern Wild Turkeys (*M. g. silvestris*) and domestic Bronze Turkeys are shown, and evidence as to the nature and origin of these molting differences is presented.

This report is an outgrowth of a study of hybridization between wild and domestic turkeys in the Ozark region of southern Missouri. Data on molting have been collected through two seasons, 1941 and 1942. A considerable part of this material comes from a flock of confined turkeys, raised at Lost Trail Game Farm, Reynolds County, Missouri, for sale as wild stock suitable for releasing. This strain, originating from hybrid parentage (domestic x *M. g. silvestris*), has been carefully selected for color and general appearance over a period of some thirteen generations, and it now closely resembles the native eastern race. The process of selective breeding toward the wild type has been accelerated by annually back-crossing part of the breeding hens to wild living gobblers in the vicinity of a state game refuge, a procedure also followed at the state turkey farms in Pennsylvania (Gerstell and Long, 1939) and Virginia (Mosby, 1941). However, in certain details of morphology and behavior these birds still display evidences of their domestic inheritance, and, as will be shown here, they are intermediate in some aspects of molting behavior between domestic and wild turkeys. Therefore, for present purposes this strain will be referred to as "hybrid," with the understanding that at least in appearance the birds are more closely related to the native eastern race than to their more distant domestic ancestors.

There is a basic sequence of molts and plumages apparently common to all turkeys, and the following accounts of the several molts are generally applicable to the species. The details were worked out largely in the hybrid strain, because it was most available for study. Differences in the extent or procedure of the molts in the wild and domestic strains are touched upon wherever they occur, but these are segregated for more complete discussion later in the paper.

The molting terminology used here follows Dwight (1900*b*) in most respects, but young turkeys pass through three molts before acquiring a stable winter plumage, the third of which is not supplied a suitable name by Dwight, and is here called the "first winter molt."

Altogether, 194 birds were examined, over three-fourths of which were in some stage of active molt. Of these, 144 were hybrids from Lost Trail Game Farm, 32 were domestic bronze turkeys obtained from farmyard flocks in the vicinity of West Plains, Howell County, and 13 were native wild birds from various parts of Missouri. The remaining 5 were miscellaneous skins from other sources. The skin collections of the

author and of the Missouri Cooperative Wildlife Research Unit, which jointly include 64 turkeys, were most valuable as a permanent source of reference. A series of juveniles of known age in these collections, obtained from Lost Trail Farm (hybrid strain), form the basis for the descriptions of the postnatal, postjuvenal and first winter molts. Most of the adult birds, however, were examined alive, and their molting status recorded on prepared record sheets.

POSTNATAL MOLT

The postnatal molt begins with the appearance of the juvenal remiges and their greater coverts. Referring to *M. g. silvestris*, Bent (1932) says: "As with the quail and grouse, the young turkey starts to grow its wings when a small chick." Actually, the process is initiated before hatching, for on day-old chicks the first seven primaries (1 to 7) project from their sheaths 6 to 12 mm., and most of the secondaries are beginning to emerge. At this stage the three distal primaries, 8 to 10, and the two distal secondaries next to the wrist, 1 and 2, have not emerged, but each of these follicles contains a down feather.

Growth of the juvenal remiges is rapid, and at eleven days the longest primaries exceed 50 mm. in length, the secondaries 35 mm., and their greater coverts are growing apace. The four feathers of the alula are evident, and primary 8 and secondary 2 are pushing out of their sheaths. The inner secondaries, 11 to 16, have begun to emerge (see fig. 35 for sequence of appearance of juvenal remiges). At two weeks the feathers of the wing have so developed that the chick is unable to carry the weight of them properly, and a "droopy-winged" appearance is characteristic.

A few days after hatching, the rectrices begin to grow, and by eleven days most of them project from the down. A week later the full juvenal tail of 18 feathers is developing rapidly, the sixth and seventh lateral pairs being the longest, with adjacent feathers in both directions grading down in size. The two central pairs are the first to mature, and they cease growth while still quite minute (approximately 15 mm.), for they are soon replaced by postjuvenal feathers. Maturing of the juvenal rectrices proceeds outward from the center of the tail, and the distal feathers are the last to cease growth (fig. 35).

The greater tail coverts, tertiaries, and some of the lesser wing coverts emerge in the second week. Growth of the juvenal body plumage becomes evident in the third week, in the anterolateral parts of the breast (fig. 36, C), and in the interscapular region of the back. The long feathers of the femoral tract soon appear. Molt spreads rapidly over the sternal and dorsal regions, thence posteriorly to the abdominal and pelvic regions. By the sixth week the full juvenal plumage has developed except on head and neck (fig. 36, F). The anterior spread of the molt is much slower, particularly on the ventral side. At five weeks the head and neck still retain the natal down, but since the bird has increased considerably in size (body weight has increased approximately six times), the plumage of these areas looks thinned and skin shows between the feathers. In the sixth week juvenal feathers begin to appear in the ear tuft and middorsal cervical region, and thereafter molt progresses slowly over the top of the head to the crown and forehead, up the throat to the chin, and lastly takes in the cheeks, lores and area around the eye. The postnatal molt of the head is not completed until the tenth or eleventh week, by which time the postjuvenal molt is more than half completed on the body and wings.

POSTJUVENAL MOLT

The postjuvenal molt is initiated early in the fourth week by replacement of the central pair of rectrices. Molt in the tail then spreads in a centrifugal manner, rapidly

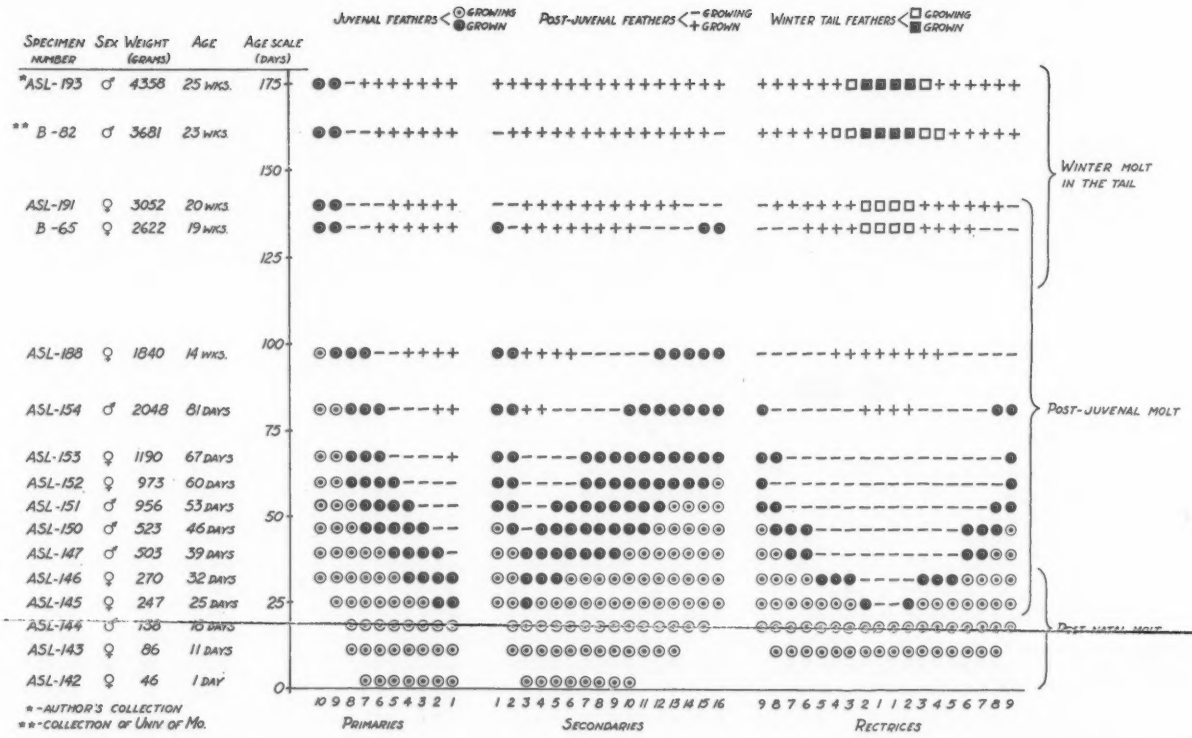
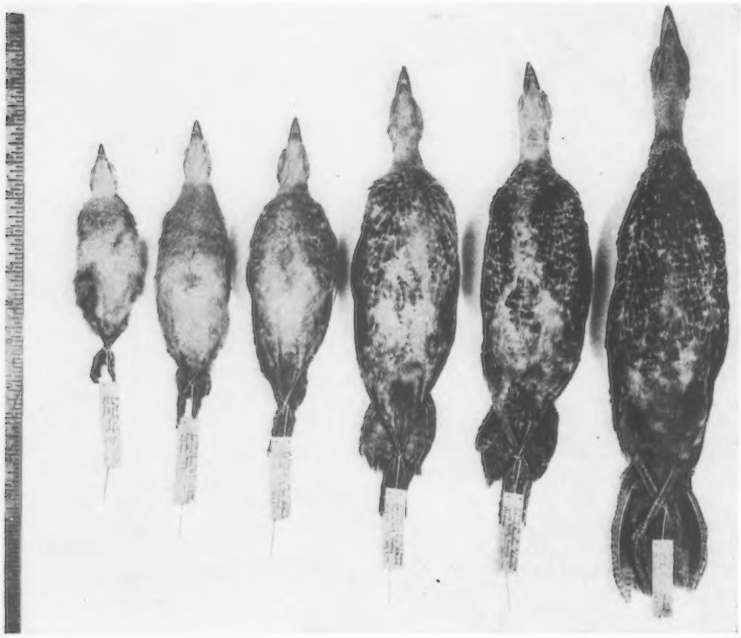

JUVENAL FEATHERS ◎ GROWING ● GROWN
POST-JUVENAL FEATHERS − GROWING + GROWN
WINTER TAIL FEATHERS □ GROWING ■ GROWN
SPECIMEN NUMBER
SEX
WEIGHT (GRAMS)
AGE
AGE SCALE (DAYS)
*ASL-193 ♂ 4358 25 WKS.
** B-82 ♂ 3681 23 WKS.
ASL-191 ♀ 3052 20 WKS.
B-65 ♀ 2622 19 WKS.
ASL-188 ♀ 1840 14 WKS.
ASL-154 ♂ 2048 81 DAYS
ASL-153 ♀ 1190 67 DAYS
ASL-152 ♀ 973 60 DAYS
ASL-151 ♂ 956 53 DAYS
ASL-150 ♂ 523 46 DAYS
ASL-147 ♂ 503 39 DAYS
ASL-146 ♀ 270 32 DAYS
ASL-145 ♀ 247 25 DAYS
ASL-144 ♂ 138 18 DAYS
ASL-143 ♀ 86 11 DAYS
ASL-142 ♀ 46 1 DAY
175
150
125
100
75
50
25
0
WINTER MOLT IN THE TAIL
POST-JUVENAL MOLT
POST-NATAL MOLT
10 9 8 7 6 5 4 3 2 1
PRIMARIES
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SECONDARIES
9 8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8 9
RECTRICES
*-AUTHOR'S COLLECTION
**-COLLECTION OF UNIV OF MO.

Fig. 35. Development and replacement of remiges and rectrices in a series of young hybrid turkeys from Lost Trail Game Farm.

at first, but slowing down as the outer pairs are reached (fig. 35). By the seventh week all save the outer two pairs of rectrices are replaced, but it is usually the fourteenth week before both of these have dropped. A deeply rounded shape to the tail results (fig. 37), until the outer feathers have caught up in growth, restoring the more nearly square shape. The greater tail coverts also molt in centrifugal order, following the



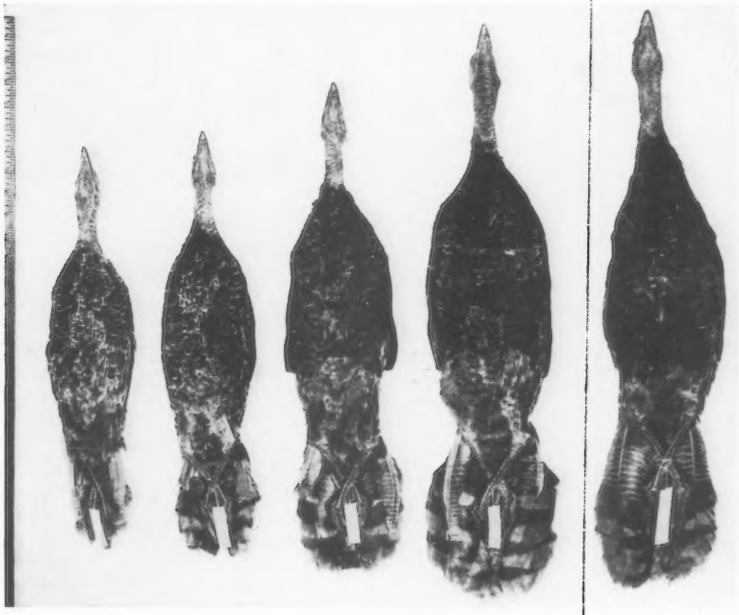
A B C D E F

Fig. 36. Young hybrids illustrating stages in the postnatal molt of the body plumage. A, ♀, 1 day old; B, ♀, 11 days; C, ♂, 18 days; D, ♀, 25 days; E, ♀, 32 days; F, ♂, 46 days.

rectrices. In the Rock Ptarmigan (*Lagopus mutus*) the postjuvenal molt of the tail is centripetal, proceeding from the outer feathers inward (Salomonsen, 1939:37).

The first (proximal) primary drops early in the sixth week. Replacement proceeds in a uniform fashion from the wrist outward, one new primary appearing every week until the fifth is reached, after which both replacement and the rate of feather growth slow down. The juvenal greater upper primary coverts, which are retained for a year in many gallinaceous birds, are replaced in turkeys, each covert falling just ahead of its corresponding primary. The molt of the primaries is never complete, the two distal, juvenal feathers (9 and 10) being retained through the first winter in *M. g. silvestris* (Bent, 1932; Petrides, 1942), but only the distal member in the domestic strain. The hybrids are divided between these two categories, as noted later. The retention of at least one of the distinctively pointed juvenal outer primaries is the best index for differentiating young turkeys from adults.

Several days after the primary molt has started, the greater upper secondary coverts begin to molt, starting with no. 3, the sequence of replacement proceeding proximally. The first postjuvenal coverts are dull blackish brown, tipped with buff, but as the molt proceeds, subsequent feathers in the series become progressively larger, with a purplish iridescence and a subterminal black band similar to that of the coverts of the adult female. In the seventh week the third secondary drops, and replacement of the second-



G H I J K

Fig. 37. Hybrids illustrating stages in the postjuvenal molt. G, ♂, 53 days old; H, ♀, 60 days; I, ♀, 67 days; J, ♂, 81 days; K, ♀, 98 days.

aries follows that of the coverts in a proximal direction (fig. 35). It is in the fourteenth or fifteenth week, when the molt of the other secondaries is largely completed, that the second and first greater secondary coverts are replaced, followed shortly by the two secondaries in that order. These late coverts become the largest of the series. This sequence of secondary replacement in the postjuvenal molt has been described by Warren and Gordon (1935) in the domestic turkey, domestic chickens and guineas. It is apparently characteristic of most, if not all, gallinaceous birds, since it also occurs in the Hungarian Partridge and Rock Ptarmigan (Salomonsen, 1939), and in Ruffed Grouse (personal observation).

The body plumage begins to molt in the seventh week, again in the interscapular region of the back and the anterolateral parts of the breast where the postnatal molt began (fig. 37). The first postjuvenal body feathers are blackish brown, narrowly tipped with cinnamon buff, and may have faint cinnamon subterminal vermiculations,

or even a cinnamon band. The tips are bluntly rounded, not narrowly pointed as are those of the juvenal body feathers, and the white or buffy shaft streaks characteristic of the latter are absent. Replacement of the body plumage progresses in much the same manner as in the postnatal molt, that is, across the breast, then posteriorly down back and belly, and lastly forward up the neck. As with the secondary coverts, there is a progressive change in form and color of the body feathers, which, as the molt proceeds, increase in size and tend to approach the appearance of adult female feathers.

It has been noted that the postnatal molt of the head was not completed until the tenth or eleventh week. As a consequence, postjuvenal replacement is delayed, but in the fourteenth week new feathers appear in the dorsal cervical region, and on crown, forehead and chin, later in loral and cheek regions. Whereas the juvenal head feathers were small (3-7 mm.) and buff colored, bearing widely spaced barbs to the tip of the rachis, the new feathers are usually black or dark brown, up to 16 mm. long, and barbs are borne no more than a third of the way up the rachis, the tips being hair-like. This gives an appearance of dark pubescence to the heads of young turkeys, most noticeable in *M. g. silvestris*, least so in domestic strains. The postjuvenal head plumage is retained through the first winter. In subsequent molts the heavy pubescence is lost, the feathers of the head being reduced both in size and number. In the native range of *silvestris* the legend of the little "moss-head" turkeys, supposedly a distinct strain, may have arisen from failure to recognize the age classes, "moss-heads" actually being immature individuals.

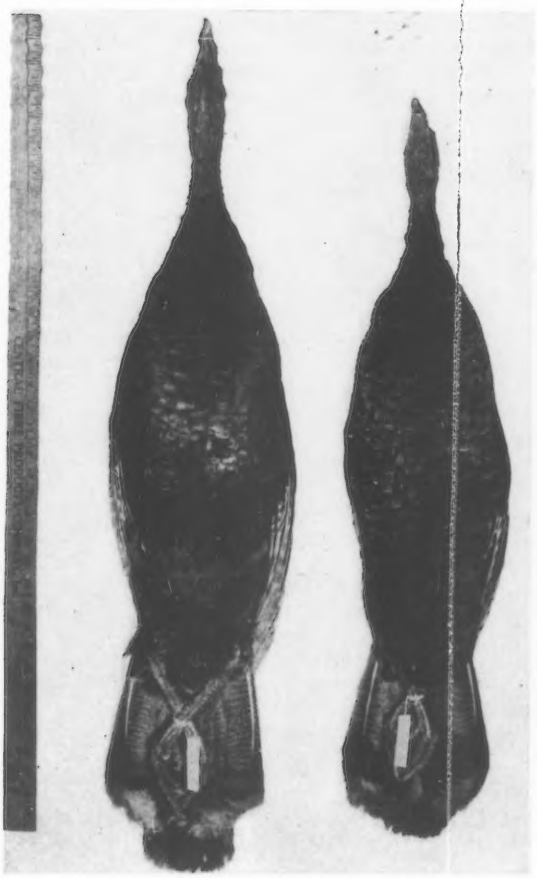
FIRST WINTER MOLT

Most gallinaceous birds wear their postjuvenal plumage through the first winter, but the ptarmigan undergoes an extensive winter molt which has been described in detail by Salomonsen (1939). The turkey also undergoes a partial first winter molt, which hitherto has not been described.

At about fourteen weeks the postjuvenal plumage is approaching full development in all regions except the head. The two central pairs of tail feathers have attained full growth, and vary in length from 210 to 240 mm., with an average width of 35 mm. Adjacent rectrices have grown considerably larger in both dimensions, and these central feathers, which were the bulwark of the tail at eight weeks, now look proportionately small. Usually in the fifteenth week these two pairs drop, as a rule together (fig. 35), and are replaced by new feathers which sometimes attain a length considerably greater than the rest of the tail (fig. 38, L). In *M. g. silvestris* and some of the hybrids the winter molt of the rectrices goes no farther, the other seven pairs of postjuvenal feathers being retained. However, in domestic turkeys this molt continues in a centrifugal progression and may take in five or more pairs of rectrices, often extending to complete the replacement of the whole tail. Most of the hybrids undergo varying degrees of tail molt beyond replacing the two central pairs, as later discussed.

On the body, winter molt starts once more on the sides of the breast, interscapular region of the back, and in the femoral tract, and spreads in the manner described for the previous two molts. The new winter body feathers show for the first time the sexual dimorphism described by Mosby (1941), namely, slightly rounded, cinnamon-tipped contour feathers in the female, in contrast to square, black-tipped feathers in the male (faintly visible in fig. 38). The new female body plumage closely resembles that of an adult hen, but the plumage of the young male still lacks the brilliant iridescence of the old gobbler.

The lesser and middle wing coverts are replaced, as well as the tail coverts. But the remiges, greater primary coverts, alula, variable portions of the tail, and the feathers of the head are exempt from this additional molt. The greater secondary coverts are



L M

Fig. 38. Male (L) and female (M) hybrid turkeys 25 weeks of age, after completion of the first winter molt in the body plumage. The partial replacement in the rectrices is nearing completion, and in the case of the male, the new feathers may be seen projecting beyond the rest of the tail.

retained in *M. g. silvestris* but are replaced in domestic turkeys. As far as I am able to determine, the body molt is complete, but due to the close resemblance of the late postjuvenal body feathers to the first new winter feathers, it is exceedingly difficult to tell from a series of skins the true extent of this body molt. If not complete, it is at least very extensive. There is no trace of typical postjuvenal body plumage in the late winter birds after molting has ceased.

The opinion has often been expressed that the white plumage of the ptarmigan,

which is assumed in the winter molt, is an adaptation to the arctic-alpine environment, either as a form of protective coloration or as a measure of conserving body heat. Salomonsen (1939) regards it as a mechanism of thermo-regulation. But the winter molt in turkeys involves no fundamental change in plumage color or texture, and it is not repeated after the first year. I am inclined to think that this additional molt is occasioned by the great increase in the size of the turkey during the first year's growth. The postjuvenal body plumage starts to grow when the juvenile is five to six weeks old and weighs around 500 grams, and it would seem physiologically impossible for so small a bird to produce a plumage adequate to cover a 5,500-gram gobbler during the winter. The proportionate increase in the size of the turkey, from chick to adult, is considerably greater than in smaller gallinaceous birds, as indicated by the following comparison with the Hungarian Partridge (weights of *Perdix* supplied by Robert McCabe in a personal letter):

Species	Average weight of day-old chick	Average midwinter weight of young male	Per cent increase in body weight
Hungarian Partridge	9 gm.	390 gm.	4300
Hybrid turkey (Lost Trail Game Farm)	42 gm.	5430 gm.	12900

In the turkey the increase in body weight during the first six months is three times greater than in the partridge. In this fact may lie the evolutionary necessity for adoption of a third molt among young turkeys in the period of most rapid growth.

NOTES ON THE ANNUAL AND PRENUPTIAL MOLTS OF ADULTS

Adult turkeys undergo two molts each year. The complete annual molt occurs during the summer and early autumn, following the breeding season. A partial prenuptial molt takes place in late winter. Insufficient material is available to describe fully these two molts, but enough is known of the annual molt in the hybrid strain to include the following notes.

The time at which the annual molt begins varies widely among individual birds, depending apparently on their sex, age and reproductive relationships. First to start molting are the young gobblers, whose mating duties, even though they do considerable strutting and gobbling, are probably light (not true of domestic turkeys). One specimen of the hybrid strain, collected while in the act of gobbling at Deer Run State Refuge, Reynolds County, May 22, 1942 (no. 180, coll. A. S. Leopold), was already growing three primaries and two secondaries. Another, obtained from the game farm on May 28, 1942, had shed four primaries and three secondaries. The last to start molting are hens with late nests. One hen at Lost Trail that persisted in stealing a nest had not started to molt on August 29, 1941. Of the wild turkeys in Missouri, most males probably start their annual molt in early June, most females in July. Domestic turkeys, whose mating season is somewhat advanced, start to molt a little earlier. The complete annual molt of an adult gobbler takes approximately four months. Salomonsen (1939) records the average period of annual or "autumn" molt in the male Rock Ptarmigan as not exceeding two months.

The annual molt is initiated by the dropping of the first primary. As in the postjuvenal molt, the sequence of replacement is progressive from the wrist outward toward the tip, but in this case the molt is complete, all primaries being replaced. Each greater upper covert is molted with, or just ahead of, its corresponding primary.

The secondary molt starts again with the third feather in the series, usually about the time the second primary is growing. In the annual molt, however, replacement of the secondaries is more complicated. After the third secondary is dropped, molt proceeds in a proximal direction, usually two or three new feathers growing at once. As

before, the two distal members of the series are dropped later, usually concurrent with replacement of the sixth and seventh feathers, respectively. But also, at about the time the second and sixth feathers drop, a new focus of molt begins in the eleventh secondary and spreads in a proximal direction, completing the replacement of the inner secondaries, numbers 11 to 16. Thus for a short period, molt in the secondaries is proceeding in three places simultaneously. This complicated pattern of secondary replacement in the annual molt is similar to the procedure in *Gallus, Perdix* and *Lagopus* (Salomonsen, 1939).

Usually after three or four primaries are shed the body molt starts on the sides of the breast and on the thighs (but not, as previously, in the interscapular region) and proceeds over the breast and down the legs and belly, thence to the rump and up the back. The dorsal cervical region is last to complete the molt. At the peak of the body molt almost half of the body feathers are growing at once.

Replacement in the tail is irregular, both as to time of starting and sequence. The first tail feathers may drop almost with the first primary, or as late as the sixth primary. Both the postjuvenal and first winter tail molts are centrifugal, originating in the center as already described, but in the annual molt, replacement is centripetal. There are nine pairs of rectrices in the turkey's tail, and molt starts in the eighth lateral pair, and proceeds inward from each side. One female specimen (no. 148, coll. A. S. Leopold) seems to have dropped the eighth, seventh, and sixth pairs simultaneously, for all these feathers have grown in to the same extent, but normally the replacement proceeds one pair at a time. The ninth, or outer pair, is retained until molt has almost reached the center of the tail, whereupon it is replaced concurrently with the central feathers. This curious reversal of the replacement order in the rectrices has no counterpart in other gallinaceous birds, as far as I know.

The prenuptial molt is represented in only two available specimens, and I am unable to describe it here. This molt appears to start among confined hybrid birds in February and to involve replacement of a considerable part of the plumage.

DIFFERENCES IN THE EXTENT OF POSTJUVENAL AND FIRST WINTER MOLTS

The degree of completeness of the postjuvenal molt is highly variable in many groups of birds, particularly in passerine forms, as Dwight (1900*a*), Miller (1931 and 1933), and Sutton (1935) have shown. In gallinaceous birds, however, postjuvenal molt usually follows a rather constant pattern and is subject to relatively little variation. The normal habit of retaining the two distal juvenal primaries is common to the whole order (Dwight, 1900*b*). Some of the families customarily also retain the juvenal greater upper primary coverts (van Rossem, 1925; Leopold, 1939; Petrides, 1942). Otherwise the molt is complete.

In all races of wild turkeys, the two distal, juvenal primaries are retained through the first winter (Bent, 1932; Petrides, 1942). In the domestic turkey, however, only the one distal primary, no. 10, is retained. A total of 56 turkeys of all strains have been examined in their first winter plumage. Without exception, all specimens of the native race, *M. g. silvestris,* possessed juvenal primaries 9 and 10, and all specimens of the domestic bronze strain had replaced 9, retaining only no. 10. Approximately half of the hybrids fell in each class. The data are summarized in part A of table 1.

The number of specimens of *silvestris* is lamentably small, but as previously mentioned, both Bent (1932) and Petrides (1942) have established the retention of the two juvenal feathers in the wing of young winter specimens, and neither of these authors mentions having found any exceptions. It appears, therefore, that a constant difference of one feather exists in the extent of the postjuvenal primary molt between wild and

domestic turkeys living in the same geographic area, and their hybrids are more or less equally divided between the two classes. A very few of the hybrid birds replaced the ninth primary on one wing and retained it on the other.

In two other respects the molts of *silvestris* and the domestic turkey are at variance; both concern the extent of the first winter molt. In *silvestris*, the postjuvenal greater upper secondary coverts are all retained through the winter, along with the secondaries. But in the domestic birds, part or all of this series of coverts is replaced in the first winter molt with showy, purplish-iridescent adult feathers. Generally the whole series is replaced, but in one group of eight young birds (Matt Adams farm, West Plains, Missouri), from four to six coverts only had been renewed in each wing, replacement always starting with no. 3 and proceeding proximally. Of 12 hybrids at Lost Trail Game Farm, five retained all postjuvenal coverts, four replaced from one to three coverts on each wing, and three replaced from four to six coverts (table 1, part B). As in the case of primary replacement, the tendency in the domestic bird is toward more extensive molt than that undergone by *silvestris*, and the hybrids show a diverse but more or less intermediate condition.

TABLE 1

Differences in extent of postjuvenal and first winter molts in wild, domestic and hybrid turkeys

	M. g. silvestris	Hybrid	Domestic
A. Retention of distal, juvenal primaries through first winter			
Retained primaries 9 and 10	5	15	—
Retained only primary 10	—	17	19
B. Replacement of postjuvenal greater upper secondary coverts in first winter molt			
No replacement	5	5	—
Replaced 1 to 3 coverts	—	4	—
Replaced 4 to 6 coverts	—	3	8
Replaced 7 or more coverts	—	—	11
C. Replacement of rectrices in first winter molt			
Replaced 2 central pairs	5	4	—
Replaced 3 to 5 pairs	—	18	7
Replaced 6 to 9 pairs	—	1	12

Similarly, in the first winter molt of the rectrices, only the center two pairs are customarily replaced in *silvestris*, whereas from four to nine pairs (whole tail) of new winter feathers are grown in the domestic turkey (table 1, part C). The hybrids are again intermediate, the great majority replacing three to five pairs (see specimens ASL-193 and B-82 in fig. 35). Although this tail molt normally proceeds in a uniform centrifugal manner, as previously stated, lateral pairs of rectrices dropping together, frequent irregularities occur, the most usual one being somewhat more rapid molt on one side of the tail than on the other. This is further complicated in some birds by the occurrence of supernumerary rectrices, an unpaired nineteenth feather being rather common in both the domestic and hybrid strains. But despite this individual variation, a clear difference is evident between the various strains in the extent of winter molt in the tail, the domestic birds again tending toward most extensive replacement, as was the case in the secondary coverts and distal primaries.

Before suggesting an explanation of this variability in the extent of the first year molts in turkeys, it may be well briefly to consider some of the known facts of molt in other species. That feather replacement is a direct response of the follicle to stimulation by thyroidal hormones seems to be well shown by a considerable amount of experimental evidence, which will not be reviewed here, but is adequately summarized by Salomonsen (1939:388-393). In explaining the variable timing and extent of the molts in widely separated populations of Rock Ptarmigan, Salomonsen found a close correlation between

seasonal temperatures and the molting habits of various groups of birds, and concluded that environmental temperature was the external stimulus, which, through direct effects on thyroidal secretion, indirectly controlled both the initiation of molt and its extent. In Scotland the winter molt of the ptarmigan was found to be incomplete, whereas in Greenland and several other localities of severe winter climate, the total white dress was always assumed through a virtually complete winter molt. The variable extent of the winter molt was laid to a temperature control. The time of inception and the duration of the molting cycles were also shown to be correlated with temperature cycles.

Salomonsen's concept of the complete external control of molt by temperature has recently been upset, however, by the work of Host (1942), who proved very conclusively that under experimental conditions the periodicity of light, rather than temperature, was the environmental factor which controlled the initiation of molt in the Willow Ptarmigan. The summer molt was induced in mid-winter by exposure of birds in outdoor pens to increasing periods of artificial light. Nonetheless, Salomonsen's temperature correlations are too complete to be ignored, and it seems highly probable to this author that temperature may have stimulating or inhibiting effects on both the rate and the extent of molt through direct effects on thyroid activity, although a light stimulus is apparently concerned with initiating the molt, possibly through stimulation of thyrotropic hormone production in the hypophysis. Such was the conclusion of Bissonnette (1935:160) from his experiments on the influence of light on sexual and molting cycles in the ferret. He states that "these hair cycles are conditioned to a considerable extent by cycles of activity of the anterior hypophysis induced by light cycles, rather than by temperature cycles alone. Variation of temperatures may, however, constitute a modifying factor, though of less importance than light changes."

Miller (1933) found a marked difference in the extent of the postjuvenal molt in *Phainopepla nitens lepida* in two climatic regions of California, birds of the Colorado Desert undergoing more complete replacement of remiges and rectrices than birds in the cooler coastal belt to the north and west. This difference was attributed to the later nesting of the coastal population, which allowed a considerably shorter period for the young Phainopeplas to mature and to molt prior to migration than that available to the non-migratory desert birds. Similarly, in *Lanius ludovicianus* Miller (1931) found differences in the completeness of postjuvenal molt in various races, particularly in the variable number of primaries replaced. But while the migratory populations (more northerly breeders) generally showed less replacement than the non-migratory forms, the correlation with migratory habit and latitude of breeding range was not complete, and Miller suggests the existence of "inherent average tendencies in some subspecies to undergo a more complete primary molt than that occurring in other races. These supposed heritable tendencies correspond to subspecific variation in purely structural features."

In the present case, variations in light, temperature or migratory habit cannot explain the molting differences in the several strains of turkeys, since all are resident in the same locality. Domestic turkeys do enter the breeding season several weeks earlier than the native birds, and most of their young, like the desert Phainopeplas, have a somewhat extended period in which to mature and complete their molts before winter; but one group of domestic birds hatching in late June, after the peak of hatch in wild birds, still followed the pattern of molt typical of the domestic strain, namely, invariable molting of the ninth juvenal primary and replacement of most of the postjuvenal secondary coverts and rectrices. Other environmental influences, such as food and confinement, have been considered as possibly affecting the molts, but rejected for a number of reasons, one of which is the fact that wild-living birds of the hybrid strain

seem to undergo the same degree of postjuvenal and first winter molt as the confined birds on the game farm. I therefore see no option but to conclude that the tendency toward more extensive first year molts in the domestic turkey is an inherited pattern, genetically controlled. It would follow that the intermediate expression of the differential molt in the hybrid birds is a function of their heterozygous genetic make-up. This view conforms with Miller's interpretation of the situation in *Lanius*. The native and domestic turkeys can therefore be considered distinct physiological strains in regard to their molting response to identical environmental stimuli.

It is recognized that all domestic turkeys were derived from *M. g. gallopavo*, the native race of central Mexico. The origin of these distinct molting patterns in the turkey might lie in the separate geographic and phylogenetic origins of *M. g. silvestris* and the domestic strain, or in the very domesticity of the latter. A single specimen of the native Mexican turkey is available that offers a clue in this regard (no. 197, coll. A. S. Leopold; taken January 8, 1938, in the northern Sierra Madre, Chihuahua, Mexico; classified as *M. g. gallopavo* until the taxonomic status of the turkeys of northern Mexico is further clarified). This bird is probably closely related to the wild progenitors of the domestic turkey and is in the mixed plumage of its first winter. All of the greater secondary coverts and all of the rectrices have been replaced with new feathers in the winter molt, which follows the pattern found in the domestic turkey, and suggests an early ancestral origin of this procedure. But the two distal juvenal primaries are retained as in *silvestris*, which, according to Petrides (1942) is normal in "all native subspecies" of turkeys. The habit of consistently dropping the ninth primary in the domestic strain may be the result of some physiological change which has occurred in the turkey subsequent to its domestication. Interestingly enough, the domestic chicken also retains only the tenth primary through the postjuvenal molt. It would be premature to draw any conclusions as to the origin of these molting differences on the basis of a single specimen, but it seems reasonable that an inherent molting pattern in *M. g. gallopavo*, distinct from that of *M. g. silvestris*, might have been further modified during the process of domestication.

The existence of distinctive characters in the molting habits of *M. g. silvestris* and the domestic turkey, and the intermediate expression of these differences in the hybrids, may have some practical use in helping to recognize the true relationships of birds of questionable origin. Particularly on game farms, where the purest possible strains of the Eastern Wild Turkey are being sought, recognition of the typical molts of *silvestris* may be helpful in selective breeding. It is not inconceivable that the molting habits of an individual turkey may be more closely associated with the physiological condition known as "wildness," than plumage color or general external appearance.

SUMMARY

Young turkeys undergo three molts before acquiring a stable winter plumage.

The postnatal molt is complete. The postjuvenal molt is complete except for the retention of one or two distal juvenal primaries in each wing. The first winter molt involves replacement of the body plumage, the lesser and middle wing coverts, parts of the tail, and sometimes the greater upper secondary coverts. A mixed winter plumage results, made up of some juvenal, some postjuvenal and some winter feathers.

Adult turkeys undergo two molts each year, namely, a complete annual molt in summer and fall, and a partial prenuptial molt in late winter.

In at least three feather tracts, the first year molts in young domestic turkeys are more extensive than in *M. g. silvestris*. Hybrids are intermediate in the extent of these replacements. Such differences in molting procedure are probably due to inherent tendencies in the various strains.

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Missouri Conservation Commission, West Plains, Missouri, and Museum of Vertebrate Zoology, Berkeley, California, April 10, 1943.

AN EXTINCT GOOSE FROM THE ISLAND OF HAWAII

By ALEXANDER WETMORE

In the course of engineering operations connected with the domestic water supply of Pahala on the Island of Hawaii, in 1926, fragmentary bones of a good-sized bird were obtained by W. O. Clark. Through the United States Geological Survey these were forwarded to the United States National Museum. The specimens were taken from a tunnel at a depth of about 100 feet from the surface at a point approximately 1000 feet to the eastward of the shoulder of the mountain peak called Kaumaikeohu, which is shown in the northeastern corner of the Honuapo quadrangle of the Geological Survey topographic map of this area.

Mr. Clark has kindly supplied the following data regarding the find: "The formation in which the bones were found was almost certainly Pahala, buried beneath 75 or 80 feet of lava flows. The bones were located on top of the ash bed or practically so, though there may have been a few (2-4) inches of ash above them. I was not present at the time that they were encountered, but when I arrived the tunnel foreman showed me the place, which as I remember it was a depression in the ash; the lava did not fit down into this small depression. Thus, the bones lay in a small cavity perhaps one foot in length and five or six inches in height."

The bones are very fragile, are stained brown in places and are considerably cracked and warped. Although the change in them may have come in part from their long contact with the ash, they present the appearance of having been subjected to a considerable degree of heat from the lava that overflowed the area.

When the specimens were first examined in the National Museum, it was obvious that they came from a good-sized goose, considerably larger than the Nene or Hawaiian Goose (*Nesochen sandvicensis*) native on the island, but beyond that there was little that could be learned from them. Comparative material in modern goose skeletons at the time was scanty and the bones from the tunnel were highly fragmentary. As years have passed, this part of the skeleton collections in the National Museum has increased steadily through addition of the Nene and of various other species until now it is possible to complete the studies of the Pahala bones that have been made from time to time through the intervening years. It develops that the goose is an extinct species of the subfamily Cereopsinae, a peculiar form that is described below as an interesting addition to the Hawaiian fauna.

Geochen rhuax new genus and species

Characters.—Tibiotarsus (fig. 39) similar to that of living *Cereopsis novaehollandiae* Latham (Index Orn. Suppl., 1801:67; Victoria, Australia), but with tendinal bridge broader and heavier: support for groove for tendon of peroneus profundus heavier, and extending farther distally; inner side of anterior face of shaft deeply grooved above tendinal bridge, with an extensive undercut.

Description.—Type, a fragmentary right tibiotarsus, U. S. Nat. Mus. no. 16740, from the water supply tunnel 1000 feet east of the shoulder of Kaumaikeohu, above Pahala, Island of Hawaii, forwarded by W. O. Clark in 1926. Shaft fairly strong, with condyles relatively heavy; front of shaft at lower end deeply grooved, with a strong undercut on the inner side immediately above tendinal bridge; inner margin of shaft rounded, outer side flattened, so that margin is sharply angular; tendinal bridge strong and heavy, and flattened, so that its longitudinal axis meets that of shaft at a low angle; a broad level space external to bridge bounded at its outer margin by a sharply raised line; support for tendon of peroneus profundus relatively broad and strong; intercondylar fossa broad, open and only slightly excavated; anterior portions of condyles largely broken away so that their form is uncertain; intercondylar sulcus broad and shallow; posterior surface of lower end of shaft broadly rounded; angles of the condyles low and rather rounded; central portion of shaft rather slender, with peroneal ridge heavy; a foramen on inner portion of anterior face a short distance below peroneal bridge, with a well impressed groove leading into it; head of bone too fragmentary to show char-

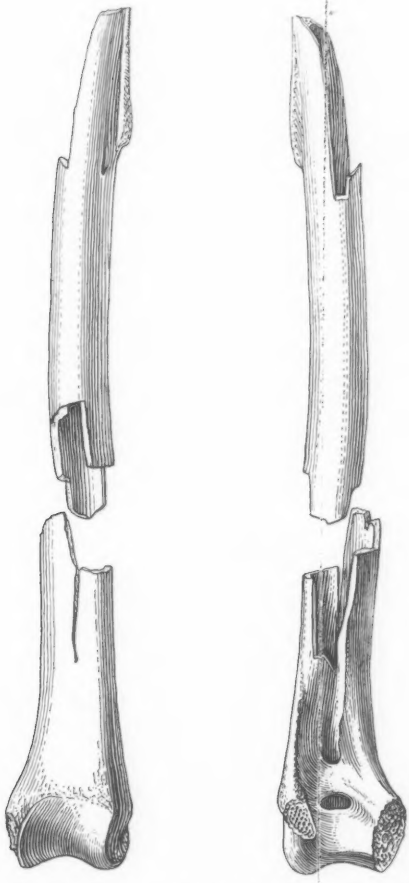

Fig. 39. Fragmentary tibiotarsus, type of *Geochen rhuax* from Pahala, Hawaii; × 1.

acters of value. Bone whitish in color, friable and considerably cracked and warped, with spots of discoloration (from ash in which it was embedded and possibly from heat).

Measurements.—Transverse breadth of shaft near center, 8.9 mm.; greatest breadth across condyles (approximate), 20.3; length of tendinal bridge, 5.8.

Other material.—In addition to the bones of the tibiotarsus just described, there are present remains of two femora, indicating a robust bone with the head broad and strong. The pelvis is represented by broken sections of the fused vertebrae and by a small section of the ischium from the lower posterior margin. There are also fragments from the head of a coracoid and some other miscellaneous fragments not certainly identified. These can all be distinguished as from a goose, but the diagnostic characters on which the new genus and species here described are based are found in the tibiotarsus.

Following receipt of the bones, Mr. Clark forwarded a detailed account of their finding with the information that the ash bed to the point where the bones were found

had varied from five or six to ten or twelve feet in thickness. The ash was originally interpreted as belonging to the Ninole series which is represented in the hills of Pahala, but later observations did not substantiate this. Under date of February 22, 1943, Mr. Clark has written me that the tunnel in which the bones were found "was being driven to develop water and as work in it interfered with the domestic supply it stopped a little short of an absolute decision as to whether the ash went into a 'Ninole' hill, or whether it lapped against it." However, the conclusion that it lapped against the hill and did not pass into it was almost certain. The formation therefore in which the bones were found was probably Pahala. Mr. Clark informs me that the actual age of the Pahala formation is not known. The overlying lava is all prehistoric and is covered by dense forest. It would appear that the bones may belong to the Recent period, though it seems that they may have an age dating back thousands of years.

The relationships of *Geochen rhuax* are highly interesting. From the skeletal evidence available, this bird appears to have been about as large as the living Cape Barren Goose (*Cereopsis novaehollandiae*) of southern Australia and to have been more similar to that bird than to any other now known. Like that species, *Geochen* shows a considerable development of the external tubercle of the oblique ligament, although not to the degree that this is found in *Cereopsis*. In the latter species the tubercle forms a pronounced knob of bone 4 millimeters in length, placed external to the margin of the tendinal bridge. In *Geochen* it is perhaps one-half as large and has a slightly lower position. This tubercle is also greatly developed in the great extinct goose of New Zealand, *Cnemiornis calcitrans*, a species that, from the leg elements, is close to *Cereopsis*.

Geochen shows no close alliance with the living Nene (*Nesochen sandvicensis*), except that both belong to the family Anatidae. Its description introduces a distinctly new element in the ancient avifauna of Hawaii. a species that evidently was mainly terrestrial in habit, and that, as stated above, is to be placed in the subfamily Cereopsinae.

United States National Museum, Washington, D.C., May 10, 1943.

ADDITIONAL NOTES ON THE BIRDS OF A BERKELEY HILLSIDE

By AMELIA SANBORN ALLEN

In an article published twenty-eight years ago (Condor, 17, 1915:78-85), I presented an account of the "Birds of a Berkeley Hillside." At that time I had been watching these birds three years. Now I have watched them for thirty years, and there are more unsolved problems than there were in 1915. Difficulties of identification absorbed most of my energy then, and I felt hopeful that with time and experience they would become less discouraging. But given the time and experience, so many other questions have come up that I feel more at sea than ever. And I am not so confident that I will find the answers to these questions.

The area, as described in the previous paper, includes the north-facing slope at the mouth of Strawberry Canyon, Alameda County, California, plus the adjoining west-facing slope outside the canyon. The part inside the canyon is still much as it was in 1915 except that all the trees are larger and cast more shade than formerly. A few houses have been built, but the university property is still "unimproved" within the area in question. Just beyond our chosen boundaries the Memorial Stadium has been built, Strawberry Creek run through a conduit, and the University Utility Shops erected on the fill above. Farther up the canyon the poultry farm has been established so that the dawn song is dominated by the crowing of hundreds of roosters. On the upper slopes opposite the poultry farm, areas that were covered formerly with brush or with ferns and grass have been planted to madrones, redwoods, deodars, eucalyptus, and pines, which means that meadowlarks, goldfinches, lazuli buntings and crowned sparrows have given way to siskins, purple finches, and juncos.

Introduced pests that are affecting the native birds are Argentine ants, eastern fox squirrels, and opossums, not to mention the tremendous increase in cats and dogs.

The west-facing hill has been used for residences, but there are still empty grassy slopes and a few old orchard trees planted by the original "homesteader" of this whole area, who is responsible also for scattered Monterey pines which penetrate into the mouth of the canyon at the level of Mosswood Road. Meadowlarks have disappeared from this western area, too, and since the Stadium was built and the opposite side of the canyon blasted down to the rocky substrata, their song is no longer heard even from that direction. In the early 1900's there were three miles of meadowlarks between Berkeley and Oakland!

In comparing the list of birds recorded up to 1915 with the list up to 1943, there are ten species that were sporadic or have decreased or disappeared, six of them especially from the west slope and four from inside the canyon. But there have been forty additional species seen: four on the western slope and thirty-six inside the canyon. Naturally there has been more continuous observation from our own house inside the canyon than anywhere else, which would partly account for the majority in favor of the canyon.

A few paragraphs will cover the species which have not been seen since 1915 or have suffered from the changes that have taken place. These are, outside the canyon: Say Phoebe, Cliff Swallow, English Sparrow (a good riddance!), Western Meadowlark, Rufous-crowned Sparrow and Harris Sparrow.

The Say Phoebe (*Sayornis saya*) has been seen only once since 1915, on September 22, 1925. It was catching insects and giving its "phoebe" call just above the Stadium.

Cliff Swallows (*Petrochelidon albifrons*) disappeared from the hill in 1915. For a year or two they nested on the dairy, but when that building was painted and prepared

to house a "model herd," they disappeared as breeding birds until they were finally allowed to nest on the Life Sciences Building, championed by Joseph Grinnell (see Condor, 39, 1937:206-210).

It was the practice even before the Berkeley fire to burn the grass on many of the slopes on the west side of the hill before the fourth of July. This date seemed to coincide with the date when young English Sparrows (*Passer domesticus*) were eager for roasted grain, for they came in by the hundreds to feed. At that time automobiles were a novelty and horses and chickens were not unknown within the city limits. Fortunately English Sparrows are far below their peak now and are practically unknown in the hill area in question, even when the grass has been burned.

Rufous-crowned Sparrows (*Aimophila ruficeps*) were abundant in the canyon (Hamilton Gulch) south of Strawberry Canyon, but a few pairs spilled over into our area. However, in the summer of 1921, Hamilton Gulch suffered a bad fire and after that this species became very rare. The observation of single birds there in the last few years raises hopes that they may finally become re-established.

The Harris Sparrow (*Zonotrichia querula*) was a vagrant of one winter only (1912-13).

The White-crowned Sparrows (*Zonotrichia leucophrys*) were listed in the 1915 report as "Intermediates" (*gambelii*) and Nuttalls (*nuttallii*). At that time an amateur could only (or did) class all the migrating winter flocks that did not sing like Nuttalls as Intermediates but got into trouble when these same birds showed yellow bills. As I practically never heard a Nuttall song on the hill, I was in trouble most of the time until, through banding, the migrant *pugetensis* was discovered. True Nuttalls nest in the Botanical Gardens at the head of Strawberry Canyon, but I have never found a pair within our area.

In the wooded area inside the canyon, fewer changes have occurred. Of the four species to be considered, two naturally belong on the east side of the Berkeley Hills in Contra Costa County. These two are the California Woodpecker (*Balanosphyra formicivora*) and the Nuttall Woodpecker (*Dryobates nuttalli*). Only two records for the California Woodpecker have been added since 1915, one in March in 1916 and the other on September 19, 1920, when five were together on the west side of the hill. [One individual was present north of the Stadium throughout the spring of 1941.—Ed.] A Nuttall Woodpecker remained in our oaks from June 24 to September 26, 1934.

The Rusty Song Sparrow (*Melospiza melodia morphna*), a winter visitant, patronized our lunch counter for five successive winters, 1915-1919.

California Quail (*Lophortyx californica*) were always abundant on our hill slope, but they did not take possession of our feeding table until 1923. Later there was a chain of feeding places: one on Canyon Road below us, then ours, then one at the end of Mosswood Road where an aviary provided sweepings of seeds. The quail trailed from one to the next and they waxed fat and multiplied—so much so that in 1934 I changed my method of feeding for the purpose of discouraging them. In 1938 the aviary was discontinued. At about the same time the introduced opossum began to take its toll (I suspect) of quail eggs, and possibly of young also. I noticed first in 1940 that I saw no broods of young quail. In 1941, on September 22, a group of eight contained four young about one-third grown. The late date suggests the pair had had difficulties earlier. Since then I have seen none. The flock of adults dropped from 23 (1934) to 12, then to 9. In 1942 this last remnant disappeared, and for months I neither saw nor heard a quail near Mosswood Road. On the south side of the hill a small flock wintered near Panoramic Way; another, north or west of the Stadium. When these flocks broke up in late April, a pair settled for nesting near upper Mosswood Road.

Two of the birds on the 1915 list have become more abundant. The Steller Jay (*Cyanocitta stelleri*) was first detected in the East Bay region in Woolsey Canyon in 1910. In 1915 they were established in Strawberry Canyon. They discovered our bird pool in November, 1917, and the feeding table in September, 1919. For many years they were centered in upper Strawberry Canyon, but they are now common in our oaks.

Until 1916 Robins (*Turdus migratorius*) were winter visitants only, but nests were found in Golden Gate Park in that year and in 1917 one was found on the east side of the bay. Now it is a very common summer resident augmented in winter by great flocks that come down from the mountains.

The forty additions to the 1915 list consist of species which I overlooked plus vagrants seen occasionally as the years passed.

Ardea herodias. Great Blue Heron. On August 20, 1920, I noticed a flock of Bush-tits giving their alarm notes and stopped to see what was disturbing them. A Great Blue Heron was flying over with slow heavy flapping of the wings.

Nycticorax nycticorax. Black-crowned Night Heron. On April 10, 1932, raucous notes attracted my attention in the evening to a Black-crowned Night Heron perched on one of the electric poles on Mosswood Road.

Branta canadensis. Canada Goose. Twice flocks of Canada Geese have flown over: on October 20, 1921, and on December 4, 1934.

Accipiter velox. Sharp-shinned Hawk. No doubt these hawks were here before 1915, for they are common winter visitants and sometimes breed in Strawberry Canyon. I did not learn their call note until March 22, 1934, when it was repeated on successive days until March 27. I have no winter records of any calling, but when they have stayed to breed I have heard the calls of the young birds when they first left the nest. I have June and July records for 1931 and 1935, and on August 21, 1942, I found a young bird perched in the conifers up the hill from the house; two adults were circling near it.

These hawks are bold hunters and are not easily turned away from a victim. In 1921 on Thanksgiving Day, November 24, a Sharp-shinned Hawk attacked a California Thrasher (*Toxostoma redivivum*) that was on the feeding table.

The aim of a Sharp-shin is proverbially sure. But twice I have known of its missing, once when one struck a wall as it stooped and the second time when in 1927 one struck the dining room window as it attempted to take a quail from the feeding table. This hawk fell, stunned, to the porch floor and caught its head under the railing. A marauding cat made for it, but I got there first and saved a specimen for the museum.

One more anecdote concerning the Sharp-shinned Hawk illustrates the boldness of hummingbirds. On July 17, 1935, one of these hawks dropped to perch on the tip of a small redwood tree on the west slope of the hill. Two Anna Hummingbirds (*Calypte anna*) first darted at it, then towered steeply and dropped like bullets. Just in time the hawk flew and started to alight on a cypress two hundred feet away. But the hummers were still in close pursuit so the hawk picked up speed and flew off up the canyon.

Accipiter cooperii. Cooper Hawk. I saw what I thought was definitely this species several times during the twenties. My best opportunities came in 1938. On May 4 I heard a note that was new to me and found it came from a hawk perched in a large oak tree just west of the house. Another hawk was flying above the trees calling, *kek-kek-kek-kek*, and after a few minutes the perching hawk flew away together with it. The next day the same note was heard at 6 a.m. in the distance. On September 16 the same note was heard and two Cooper Hawks were seen. On October 6 one flew past a north window, rose above the trees and began to circle. It took about five to seven minutes to rise 1200-1500 feet (estimated from the 300-foot Campanile) and then it sailed directly south. On November 23, 1939, I heard its call again near my window and heard the noise of its wings as it flew. I suspect it flew from the roof. In 1940 one was located by its note on March 2, and in 1941 on April 17.

Circus hudsonius. Marsh Hawk. Several times I have seen Marsh Hawks over the hills in winter, but I have only one record for this area. On September 23, 1919, one was rising in spirals over the west side of our hill.

Phasianus colchicus. Ring-necked Pheasant. In 1937 a pheasant was in the garden together with another "introduction" which bodes no good—the eastern fox squirrel.

Fulica americana. American Coot. Soon after the north Berkeley fire, on October 10, 1923, the California Jays near the house were much excited. I supposed they were mobbing an owl, but in a few minutes I learned that there was a strange bird on the porch. It was a lame coot.

Oxyechus vociferus. Killdeer. These birds are common on the grassy fields on the lower university campus in winter, but a steep hillside does not attract them. I have, however, heard them flying over, always during fall or winter. It is possible that they feed on the Stadium lawn, although one of my dates precedes the building of the Stadium.

Columba fasciata. Band-tailed Pigeon. On February 27, 1921, thirteen Band-tailed Pigeons were seen flying over the west slope of the hill. Two spent several days in our oaks, January 11 to 17, 1935; two were seen on February 5, 1936, and in March, 1937.

Zenaidura macroura. Mourning Dove. These doves nest in the Botanical Gardens at the head of the canyon and occasionally fly over. On March 16, 1942, I found one perched on the electric wire on Panoramic Way (an early date).

Phalaenoptilus nuttallii. Poor-will. I have two September records, one in 1934, when, on September 24, I counted 143 repetitions of the call with no decrease in tempo, then more slowly up to 155. In 1939 one called repeatedly on September 4.

Selasphorus rufus. Rufous Hummingbird. Dates for the migration range from March 4 to May 16.

Megaceryle alcyon. Belted Kingfisher. Almost every fall I hear kingfishers near the swimming pool in Strawberry Canyon. Usually a single bird flies over but on one occasion two passed our house. The entries range from July 17 to November 24: one only in July, six in August, five in September, three in October, and one in November. I have one record in spring: May 10, 1926.

Dryobates villosus. Hairy Woodpecker. I have only three records for this limited area, one on July 12 and 16, 1935, and one on September 17, 1942. A pair stayed for the breeding season of 1943.

Dryobates pubescens. Downy Woodpecker. This species was not included in the 1915 report but it is not uncommon. Several times I have found one in spring digging a hole in a dead oak branch, but the job was never finished. Five records fall in March and April, three in June and July, nine in August and September and one in January.

Myiarchus cinerascens. Ash-throated Flycatcher. I saw my first Ash-throated Flycatcher in Hamilton Gulch on August 5, 1918, and supposed that any future records for this bird in our area would be of post-breeding wanderers. But that did not prove to be the case. One was seen in the oaks east of the house on April 8, 1928. In both 1933 and 1936 there was one with flocks of warblers and other birds that were feeding on the oak worms during rain storms. On May 1, a flycatcher took the worms by picking them off as it flew by a branch. On June 10, 1933, the call of an Ash-throat was heard repeatedly in the direction of the swimming pool and on June 13, 1935, one called and gave its double note while perched just outside the kitchen window.

Myiochanes richardsonii. Western Wood Pewee. Before moving to our house in Strawberry Canyon, I became very familiar with the Western Wood Pewee both in Berkeley and in the mountains. I expected it to be a common summer bird in the canyon. But I did not find any in our area before 1915. In May, 1915, I found only one pair between our house and the swimming pool. Many years I have recorded none at all during the summer. On June 8, 1942, one was seen on upper Mosswood Road.

Hirundo erythrogaster. Barn Swallow. On August 24, 1921, a lone Barn Swallow crossed the mouth of the canyon just above the pine trees, flying from north to south.

Sitta carolinensis. White-breasted Nuthatch. In the summer of 1931 there was an extensive fire on Mt. Diablo in Contra Costa County, and thereafter these nuthatches became abundant in Berkeley. From August 4, 1931, to January 27, 1932, several made themselves at home at my table.

Nannus hiemalis. Winter Wren. The dates for the Winter Wren range from September 5 to April 7. Of fifty entries the largest number is in October (15), with November a close second (12). I have none for February, six in March and two in the first week of April. On November 30, 1919, one sang its full-voiced song below the house. Another sang daily from March 11 to 28, 1943.

Sialia mexicana. Western Bluebird. Most of the entries for bluebirds are between August 16 and February 12 and refer to birds flying high over Strawberry Canyon. I believe they have nested in the Botanical Gardens at the head of the canyon, but I have never found them in the area covered, during the summer season. On April 19, 1924, I could hear their calls in the direction of the University Dairy.

Myadestes townsendi. Townsend Solitaire. Occasional winter visitant in the East Bay region. It seems to find a site where berries are abundant and remains as long as the food holds out. For two winters it was found just below the area covered, to the south of the Stadium, and it was there that I heard its whisper song on March 9 and 10, 1921. It was not until 1942 that I found one on our hill, first in Hamilton Gulch on March 9. I found out later that it had spent the winter higher up on the west slope (Arden Road). On March 16 it was catching insects in the grass and on March 26 had worked its way to the mouth of Strawberry Canyon. It spent nearly a month there and before migrating visited a plum tree at the entrance to our garden.

Bombycilla cedrorum. Cedar Waxwing. Not common in the area. Occasionally in the fall I have seen them in some deciduous trees or a cypress across Mosswood Road and in the spring they take the last berries from a hedge at the mouth of the canyon. But on April 25, 1933, a flock of about fifty came into the oaks and fed on the oak worms.

Vireo solitarius. Solitary Vireo. This vireo occasionally is found nesting in protected canyons in the East Bay region. On June 9, 1942, I found a young bird not long out of the nest on upper Strawberry Creek. It was being fed by an adult. In addition to these occasional breeding records, the unmistakable song of this species is not infrequently heard in the woods near our house, particularly in April. They seem to be "on their way." I have five entries from May 3 to May 29. Three fall dates range from August 9 to October 24. On August 9, 1929, one came into the oaks near the northwest porch under which a pair of Western Flycatchers were feeding young still in the nest. The flycatcher tried to drive the vireo away, but it kept coming back, finally coming within five feet of where I stood on the porch.

Vermivora celata sordida. Dusky Orange-crowned Warbler. I have detected only one of these birds in our area. It was bathing in the pool on December 7, 1920, and because of the date may be assumed to be of this race.

Dendroica aestiva. Yellow Warbler. After all the breeding Yellow Warblers have left Berkeley about the middle of August, mixed flocks of migrating birds often stop at my pool for water. These consist of vireos and warblers of different kinds and Yellow Warblers are often among them, particularly immature individuals. The dates fall between September 11 and September 29. In the spring, migrants are seen particularly from April 15 to May 20, being especially abundant in years when there are late rains. The Yellow Warbler has been seen in these flocks.

Dendroica occidentalis. Hermit Warbler. This bird was added to the list for the region in the same way—as members of migrating flocks—and the dates of entries are: in spring, May 10 and 11, 1915, April 29, 1928, May 7, 1933, and April 24 and 26, 1935; in fall, September 22, 1918, and October 18 and 30, 1921.

Icteria virens. Chat. Dates for the Chat are May 12, 1915, and May 11, 1917. Both times individuals were heard in full song.

Icterus bullockii. Bullock Oriole. Not as common in Berkeley as it is on the east side of the hills, but it does occasionally nest here. On our hillside it is a bird of passage in spring. Of the ten entries in my diaries, six are in April, all but one in the last week; two are in May. One on July 13, 1935, may have been breeding in the neighborhood.

Euphagus cyanocephalus. Brewer Blackbird. These blackbirds seem not to be hill dwellers. They appear in my diaries in August, September, and October, when I heard them calling at dawn as they flew from their roost in the Monterey pines on the campus across to the plowed fields in Contra Costa County where they fed during the day

Piranga ludoviciana. Western Tanager. Seen every spring and fall as they pass through the region. Of the seventy-five entries, 18 are in August and 30 in September; 5 in April and 19 in May. In June there is but one—on June 21, 1938; on July 14, 1939, one was heard in a pine tree above Mosswood Road.

Carpodacus cassinii. Cassin Purple Finch. On December 21, 1916, I was attracted by a chorus of alarm notes which sounded as if dozens of Brown Towhees were calling. I found twelve Cassin Purple Finches in the deciduous trees near the edge of our lot, among them four males with the red feathers lifted into a crest. They remained some ten minutes. I could not detect the cause of alarm. When they quieted down, they began to eat the buds on the oak trees and uttered softer notes similar to those of the Purple Finch (*Carpodacus purpureus*). They left as a flock.

Spinus tristis. American Goldfinch. These goldfinches are less common than the Green-backed Goldfinches in Berkeley, but they have their favored habitats in the hills or canyons. I often find them flying over near the mouth of Strawberry Canyon; there are two records of their making use of the bird pool, both of them in November.

Loxia curvirostra. Red Crossbill. Detected first on January 15, 1920, when a small flock was feeding in an almond tree in the old orchard. Both males and females were present and they were noisily prying open the shells of the almonds and eating the nuts. They remained in the general region almost a month. On February 23, 1923, a flock of 8 to 10 flew over, calling *kimp, kimp, kimp*. On March 2, 1939, a flock of 25 alighted in the big pines at the mouth of the canyon.

Junco oreganus pinosus. Point Pinos Oregon Junco. It has been interesting to follow the spread of this junco in Berkeley. Before 1914 I had worked out the earliest dates of arrival for the Oregon Junco as October 17 and the latest date of departure as April 10. Between 1914 and the date of the finding of the first nest, I had several records of single birds found singing later than April 10: one near Founder's Rock on April 28, 1914; one above the Greek Theater on April 24, and four together there on June 20, 1915; also one on the Chemistry Building on July 2, 1915. On May 15, 1917, on

the grounds of the Claremont Country Club, I found the first nest reported in the San Francisco Bay region. By 1918 the local Berkeley birds had spread from their center on the campus to our hillside. This junco is now one of the common breeding birds of the area.

Spizella passerina. Chipping Sparrow. Often found in the breeding season in the Botanical Gardens and elsewhere in the canyon, but I seldom find it in our area. In 1938 and again in 1939 the song was heard repeatedly in April and May below our house near Canyon Road.

Passerella iliaca iliaca. Eastern Fox Sparrow. I have three records for my garden: November 8, 1926, February 14, 1936, and February 6, 1940. The third bird was seen pulling a long angle worm into its beak a little at a time without breaking it up.

Zonotrichia albicollis. White-throated Sparrow. In the fall of 1915 a White-throated Sparrow came to my feeding table. Again in 1922 one appeared and I succeeded in banding it on March 22. In 1923 it returned, and before it left I was able to read the band and found that a wanderer from the usual migration route had returned to the same table two years in succession. The species has been recorded much more frequently since 1923 along the western coast.

Comments on many of the birds in the list of 1915 are just as pertinent in 1943. The Black Phoebe still "makes itself heard constantly from the direction of the swimming pool." "For three winters" (seventeen now) "I have found the Western Gnatcatcher" and I may add that dates range from August 22 to May 10. The Tolmie Warbler still breeds "just beyond the end of Mosswood Road." But Thrashers no longer "come regularly to the feeding ground," and Brown Towhees are now missing at meal time (too much shade?).

Much more information has been collected concerning the nesting of certain species. Screech Owls (*Otus asio*) left the rotten oak stub below the house in 1937 and took possession of a flicker box under the overhang of the roof on the south side of the house. In 1939 their occupancy of this box continued from February 6 to June 25 and they raised four young. On June 25 one of the young birds left the box before noon and made itself comfortable in a wicker chair on the front porch; a little later in the day another perched on the rung of the chair and still later two others huddled in a dark corner. At dusk all four were together in the corner but after dark they took to the trees. In 1941 the young flew on July 2 and in 1942 on July 3.

The favorite nesting site of the Western Flycatcher (*Empidonax difficilis*) for many years was under the northwest porch, but when the porch was rebuilt the new set-up did not meet their requirements. In June of 1941 a pair began six nests on a beam in the newly built garage, finally settled down to one of them, and raised a family. The birds arrive sometime between March 12 and April 15. Nests are usually finished by the middle of May and the young fly soon after the middle of June. Within a week or ten days the young are independent and a second nesting is begun.

In 1929 the young of the first brood flew on July 2 and on July 4 I saw them making short flights and catching their own insects. Already the adults were showing a renewed interest in the nest. By July 16 the female was sitting again, and on August 15 the second brood was out of the nest. On August 19 the young birds came into the spray of my hose, and then they were seen no more. In all the years I have only three records for Western Flycatchers during the last half of August; but single birds (from farther north?) have appeared between September 12 and October 2.

Two nesting boxes built for small birds have been used by the Titmouse, Bewick Wren, and House Wren. The Bewick Wren (*Thryomanes bewickii*) has its center of abundance on the north-facing slope of the canyon and appropriates many of the natural cavities in the oaks. Pairs made use of the lower box in 1916 and 1930; of the upper box in 1918 and 1932 and of the *flicker* box in 1919 and 1936. These were all successful nestings and the young left the nests between May 10 and June 26. In 1919 the flicker box, which before that date had been in the east gable and was used as a daytime roost by a Screech Owl, was taken down and was standing on a brick pier at

the entrance to the front porch waiting for a convenient time to put it up on the south side of the house, farther from the feeding table. The Bewick Wrens took possession on April 11. I moved the box to another pier five feet away and they brought off their brood on May 30. In 1936 the box was under the edge of the roof, and they again made use of it. Even after the Screech Owls took over the box, several times I saw both Bewick and House wrens carry sticks into the box; but after a night of Screech Owl activity they went elsewhere.

House Wrens (*Troglodytes aëdon*) used the upper box in seven different seasons from 1921 to 1939. Dates when the young left the nests fall between June 6 and July 7. In 1930 the lower box was occupied by a pair of Bewick Wrens on March 21. On April 17 a male House Wren was enticing a female to the upper box but the female Bewick Wren interfered. The male House Wren sang all the time in the greatest excitement, now uttering purring notes to encourage the female House Wren, now snapping his bill as he drove off the female Bewick Wren.

In 1939 there were two pairs of House Wrens, one in the upper box and one in the lower box, both on the east side of the house. The two males vied in song, each singing near his own box. But on May 20 both males were singing in the trees west of the house and chasing each other. The one at the upper box returned to his own quarters, leaving the other in possession of the western woods. On June 7 one of the fledglings was found dead under the upper box, and on June 8 two more had been killed. A cat or a jay would have eaten the prey. The finger of suspicion points to the dominant wren of the lower box but there is no direct evidence.

The lower box was used by Plain Titmice (*Baeolophus inornatus*) eleven seasons and the upper box once. Twice the five eggs failed to hatch. In 1923 and 1926 the nests contained seven eggs. On May 2, 1924, for photographic purposes I took the fledglings into the front porch, which was screened with mosquito netting. They could cling to the vertical shingles and climb up the netting but had difficulty holding on to a twig.

In 1926 a pair that nested in the upper box had a brood of seven and established a record for earliest dates: building, February 25; flight of young, April 24. On March 14 of that year a Plain Titmouse and a Song Sparrow were both perched on a branch of spiraea, facing each other and two feet apart. The sparrow was tense and motionless; the titmouse held the body tense but was going through a rhythmical motion of the head and neck as far as possible from side to side. This continued for several minutes. Then the sparrow relaxed but the titmouse kept on with the pendulum for six or eight more strokes.

In 1927 a pair began building in the lower box on April 7. By May 18 they were scolding the jays and feeding young that were calling loudly. When the young flew on May 23 the last bird out was attacked by a jay when the parents were a short distance from the box, herding those that had just flown. The last youngster flew across to the porch railing near my post of observation. A California Jay came around the corner of the house, spied the fledgling and flew at it. The little bird darted through a gap in the top of the oak tree with the jay in close pursuit. I clapped my hands, an adult titmouse flew at the jay and the youngster escaped. The family stayed in the vicinity for two weeks.

In 1928 a male began singing near the box on January 10. On March 9 I took a picture of the pair on the feeding table. The next day the male gave his call 108 times in five minutes at dawn. On March 27 there were two eggs in the box. On April 3 I tapped on the box before lifting the lid; like a bunch of loose feathers the sitting bird suddenly exploded and hissed but did not leave the nest. The young flew on May 8.

For many years thrashers were among the birds most frequently seen. Out of two

hundred separate entries on the species, the largest number is for September (40). All the dates for molting are in August, and in September they are labelled "very sleek," or "in fine feather." And it is in September that I have recorded imitations of other birds most frequently. Sometimes the imitations have been quite puzzling and would seem to indicate some movement of thrashers in the fall. For example, in 1917, on September 21, the notes of a Chat were woven into the song. From September 24 to 28, 1917, the *kuck-kuck* of the robin was heard, and that was the first year the robin's nest was found in the East Bay region. In 1920 on September 5 one incorporated the triplet of the Ruby-crowned Kinglet; this is hard to explain unless the phrase was carried over from the previous spring. Imitations of the Olive-sided Flycatcher were recorded twice in August, twice in September and once on April 1. The quality of the tone was exact but it had less carrying power and was repeated several times in the middle of the usual thrasher song: *Tow-whee-o, whip-it now, pee-hew, pee-hew, pee-hew, dorothy,* etc.

Foods taken by the thrasher were berries, apple, oatmeal, chick-feed, and bread. One meal recorded "at one sitting" consisted of nine beakfuls of oatmeal and thirteen toyon berries. In 1924 a pair adopted canary seed as a food. When the sparrows take seeds there are no pecking sounds. When quail take them there is a very rapid light pecking. When a thrasher takes a seed his beak comes down hard and he takes time to swallow before he gives another sharp peck.

Until recently thrashers were constant singers near our house on warm days in winter especially after January 1. But with disappearance of a favorite perch higher up the hill and the increase of houses on top of the hill, their winter quarters seem to have been more definitely limited to Hamilton Gulch and the brushy areas higher up on the ridge. After April 1, however, they are again within hearing, possibly raising a second brood on the north-facing slope when the sun is higher in the sky.

In addition to these more spectacular birds, the elusive warblers have claimed much attention. The leaves on the live oaks are so dense after the middle of March that the search for warblers is no child's play. It was not until I began to live on a level with the tops of the oaks that I discovered that there is a migration of these birds along this coast at the same time that they are passing through the east and middle west on their way to Canada. The warblers that breed in the area are the Lutescent, Tolmie and Pileolated with occasional Yellow Warblers within hearing. All of these are established, and some already have young out of the nest before this migration of northern birds takes place.

In 1915 the month of May was unusually rainy. On May 10 I recorded both Townsend and Hermit warblers feeding on oak worms; on May 11, Yellow, Townsend, Hermit and Pileolated; on May 12, Townsend and a Chat. As all were in full song, it was a red-letter period for a bird watcher. On May 10, 1934, a group of adult Pileolated Warblers came to the pool.

In the fall warbler days occur the last week of September as a rule. In 1918 there was an electric storm on September 21, and the next day there were Lutescent, Townsend, Hermit and Pileolated warblers in our oaks. In 1928 Black-throated Gray Warblers were seen on September 12 and in 1934 on September 7 and 24; in 1936, September 8 to 14, and they were still here on October 12.

One of the problems for a householder who has built in the midst of live oaks is what to do about the oak worms that devour the young leaves each spring. Great numbers of birds are attracted by the abundant food supply during the spring migrations and if they stay long enough they do reduce the worms to such proportions that the nesting pairs can later prevent the defoliation of the trees. On June 6, 1928, I estimated

the number of nesting birds feeding in the oaks near our house all day and every day as follows:

Titmouse	2 adults and 1 brood	7
Bush-tit	6 adults and 3 broods	24
House Wren	2 adults and 1 brood	8
Lutescent Warbler	6 adults and 3 broods	18
Towhees, Song Sparrows, etc.		24
Total		81

No spray was needed.

But there have been years when the trees have been defoliated three times between May and November. Each time the trees produced new leaves. The danger to the trees lies, I believe, in the chance of a heavy frost when new tender leaves have come out in November. Another angle of the problem concerns the parasites which attack the worms but on that I am not competent to express an opinion.

The practical plan adopted after years of experience has been to postpone spraying until we are sure that the birds have not been able to handle the situation. As soon as the worms begin to feed, their droppings cover the brick pavement and from day to day these may increase. If they continue to increase beyond the middle of May, when the migration even of Alaska birds is past, it is questionable whether the birds breeding in the area will be a sufficient check to prevent a second generation of worms from developing.

In 1928 I saw for the first time a flight of termites. On November 4, the first clear day after the first rain of the winter season, a swarm of the winged termites dropped to the pavement at the mouth of Strawberry Canyon, shed their wings and began to crawl in pairs up Mosswood Road. I noticed that many birds were coming from the shrubbery to feed on the insects and found that the following species were taking advantage of the sudden windfall: Wren-tits, Bewick Wrens, Hermit Thrushes, Brown and Spotted towhees, Golden-crowned Sparrows, Fox Sparrows and Song Sparrows. Even a Flicker swooped down as if to alight on the pavement but swerved when he saw me.

As I said at the beginning of this account, questions have presented themselves during the years that are still awaiting satisfactory solutions. Some suggestions have been offered and it is to be hoped that they may bring out other evidence that is hidden away in the notes of other bird watchers or bird banders which may help to clarify certain obscure points. If this confession of inadequate consecutive observations leads to a filling in of certain gaps, it will have accomplished its purpose.

Berkeley, California, May 5, 1943.

FROM FIELD AND STUDY

A Singing Female Oven-bird.—The scarcity of museum specimens of the Gray Oven-bird (*Seiurus aurocapillus cinereus*), newly named subspecies (Miller, Condor, 44, 1942:185-186) with type locality in the Custer National Forest, Powder River County, Montana, indicated the desirability of collecting members of this race whenever the opportunity might arise. On June 22, 1942, I had occasion to be in the Custer National Forest eight miles south of Ekalaka, Carter County, Montana. This region is a few miles east of the type locality mentioned above. Oven-birds were in full song, enabling an observer to locate them with ease. One bird, singing the familiar notes, was stalked while it walked among the fallen leaves and branches on a side hill clothed with yellow pine and an undergrowth of alder. The bird was subsequently collected and prepared as a study skin. The specimen, collector's number 32(1942), was found to be a female containing a normal ovary in which several follicles in a late stage of development were present. The apparent lack of published records of female warblers in song, coupled with the fact that the singing of a female Oven-bird is heretofore unknown, makes this incident worthy of recording.—ROBERT W. HIATT, *Montana State College, Bozeman, Montana, May 10, 1943.*

Cooper Tanager at Santa Barbara, California.—On March 7, 1943, Father Severin Baumann captured in one of his banding traps at the Santa Barbara Mission, an immature male Cooper Tanager (*Piranga rubra cooperi*). As he removed it from the trap, it uttered a couple of harsh calls and another bird answered from a tree a short distance away.

I mounted the specimen for the bird hall of the Santa Barbara Museum of Natural History.—EGMONT Z. RETT, *Santa Barbara Museum of Natural History, Santa Barbara, California, April 13, 1943.*

Description of a Race of Goldfinch from the Pacific Northwest.—Several years ago a single specimen of the goldfinch from western Oregon had attracted interest because of its dark, rich coloration, but the matter was not further pursued at the time and until recently had been forgotten. The Dickey Collection now contains a series of twenty-three goldfinches from western Washington and western Oregon, and there are also available four from Vancouver Island and one from western Oregon in the Bishop Collection. These differ in several respects from typical *Spinus tristis salicamans* of southern California; in fact on the basis of the material at hand it seems odd that the existence of a northwestern race has previously escaped formal notice. In slight recognition of the fine work accomplished in the Pacific northwest by Stanley Jewett, and also because of a pleasant acquaintanceship extending over many years, I propose as a name

Spinus tristis jewetti, new subspecies
Northwestern Goldfinch

Type.—Female, apparently fully adult, in fresh fall plumage, number 19823 Dickey Collection; Ashland, Jackson County, Oregon, October 19, 1923; collected by William Sherwood.

Subspecific characters.—A small race of *Spinus tristis*, similar in this respect to *salicamans* Grinnell of southern California (wings of 17 males average 69.4 mm., of 9 females 67.2). Both sexes in winter plumage everywhere darker and browner than in *salicamans*; back Saccardo Umber instead of Tawny-Olive; flanks Tawny-Olive to Sayal Brown instead of grayish Tawny-Olive; under tail coverts and edging of inner secondaries more strongly suffused with brown. The characters are most evident in newly acquired fall plumage but are observable up to the time of the prenuptial molt.

Range.—Coastal slope of western North America from southern British Columbia south to southwestern Oregon, and probably to northwestern California.

Remarks.—Salicamans from southern California differs markedly from other races of *Spinus tristis* in the partial, sometimes nearly complete, suppression of the prenuptial body molt of both males and females. It occurs gradually and in an irregular, patchy manner over a period of several months from about mid-January to late in May and the vast majority of individuals apparently never attain the full summer plumage. Egg laying begins in early April, in the midst of the molting process, and it has been suggested to me that breeding activity at this time might be in part responsible for the partial suppression. However, I have personally observed simultaneous breeding and molting in a considerable number of birds in the tropics where no such suppression was evident, and I am inclined, therefore, to consider it in the present case a racial characteristic. My own collecting has produced only one individual of each sex which wore a complete summer livery, but there is a rough portion of one in ten according to the total number (147) examined. What the proportion is in other races I do not know, but an incomplete prenuptial molt is obviously a relatively rare condition. One summer

(June) male of *jewetti* has retained the winter plumage on the entire abdominal area; the other nine summer males and all four summer females show a complete prenuptial molt.

Grinnell, in connection with his original description of *salicamans* (Auk, 14, 1897:397), has previously emphasized the molt of southern California birds as compared with *tristis* of the East; significantly, also, he noted the browner coloration of an unstated number of Oregon and Washington specimens, although in accord with the recognition standards of a half-century ago he did not name them.

Specimens of *jewetti* have been examined from Vancouver Island, 4 (Comox); Washington, 10 (Seattle, Tacoma, Gray's Harbor, Clallam County); Oregon, 14 (Eagle Point, Ashland, Salem, Tillamook, Eddyville, Gold Beach). A midsummer, full-plumaged male from Humboldt County, California (Bishop coll.), is placed here on a presumptive basis. One hundred forty-seven specimens of *salicamans* have been examined from San Diego north to Fresno and Palo Alto in California. Evidence of an approach to *jewetti* is seen in the Palo Alto series of six specimens in the Los Angeles Museum.

My sincere thanks are due to Dr. Bishop and Mr. George Willett for unrestricted use of the collections at the Los Angeles Museum.—A. J. VAN ROSSEM, *Dickey Collections, University of California, Los Angeles, March 12, 1943.*

White-tailed Kites in Santa Barbara County, California.—On the afternoon of November 15, 1942, I had the pleasure of seeing eighteen White-tailed Kites (*Elanus leucurus*). Most of them were in the lower Lompoc Valley within five miles of the ocean. All birds were counted from the main highway between Lompoc and Surf. Had time allowed, I have no doubt that several more could have been observed. With hardly an exception the birds were in pairs; in one instance four pairs were found in an area of not more than twenty acres which was surrounded by approximately 200 acres which were identical in topography and cover to the area of concentration. At least one other observation indicated a gregarious tendency apparently unassociated with any economic expediency.

The chief concentration was on level land on the floor of the valley one-half mile to two miles south of the Santa Ynez river. Formerly this region was cultivated, but at present it is a part of Camp Cooke, and the fields are covered with dry grass and occasional tall, dry weeds.

I also saw and had reported to me a few individual kites from the area two or three miles east of Lompoc. In eight years residence here I have previously seen only one or two pairs of White-tailed Kites in the lower valley, where they apparently nested.—DALE T. WOOD, *Lompoc, California, March 29, 1943.*

The Starling in Eastern Washington.—On March 20, 1943, four students in my ornithology class (Stanton Jamison, George Klemz, Warren Bischoff, and Stanley Smith) and I saw a group of five Starlings (*Sturnus vulgaris*) along the road in Spring Flat, eight miles north of Pullman, Washington. The birds were feeding on the ground and were observed from a distance of forty feet. The identification, therefore, is accurate.—LEONARD WING, *Department of Zoology, State College of Washington, Pullman, Washington, April 16, 1943.*

A Partly White Red-winged Blackbird From the Willamette Valley of Oregon.—On January 17, 1943, I observed a mixed flock of Brewer and Red-winged blackbirds perched on a watering trough a few miles south of Corvallis, Oregon. One of the Red-wings (*Agelaius phoeniceus*) had just a tinge of buff at the bend of the wing, the rest of the body being black with the exception of a broad white strip down the center of the tail and white primaries. These snowy white areas showed up in contrast to the black body and buff patch on the wing. This is the first "partial albino" Red-wing known from this area.—FRED G. EVENDEN, JR., *Oregon State College, February 15, 1943.*

Some Birds Not Commonly Observed in Utah.—Because of the scarcity of authentic published records of the following species of birds in Utah, it seems appropriate to record their recent occurrence at or near the Bear River marshes in northern Salt Lake Valley, Box Elder County.

Anas rubripes. Black Duck. A male bird was collected on December 8, 1942, by Mr. W. M. Bransford of Salt Lake City who gave the bird to Mr. Vanez T. Wilson, Superintendent of the Bear River Migratory Bird Refuge. A study skin was prepared by Dr. E. R. Quortrup. Close examination of this bird shows a trace of mallard ancestry, as evidenced by the slight amount of greenish coloration on the head. Dr. J. W. Aldrich, who also examined the bird, states that the speckled head and distinctly reddish feet suggest the northern race, *A. r. rubripes.*

Clangula hyemalis. Old-squaw. A male was observed at close range and later was seen flying over Unit 5 of the Bear River Migratory Bird Refuge near Perry, Utah, in December, 1942. One or

two birds had been observed at the refuge in previous winters, and 13 individuals were taken in the open hunting season of 1934.

Larus argentatus. Herring Gull. The Herring Gull is becoming a fairly common visitor to the Bear River marshes, although it was considered merely an accidental visitor to the State until about 1938. Since that time a dozen or more have been seen each year and a number of specimens have been taken. In June, 1915, at the mouth of the Bear River, Dr. Alexander Wetmore found the remains of a specimen that had died during the previous winter or spring. Despite three seasons of intensive work on the Bear River, Wetmore did not find a live bird. Most of our records refer to the spring or fall, but a few individuals have been noted throughout the winter, and at least one immature bird spent most of the summer of 1941 in the northern part of Salt Lake Valley. Since February 26, 1943, one or more birds have been observed almost daily on the Bear River Migratory Bird Refuge.

Sturnus vulgaris. Starling. We regret to report that this unwelcome foreigner seems to be increasing rapidly in Utah. Between 75 and 100 birds were observed feeding on the glasswort (*Salicornia*) mud flats near the headquarters of the refuge on March 12, 1943. They have been observed by a number of the refuge personnel. If the birds become abundant and firmly established, this fruit-producing section of northern Utah will probably suffer as a result of their depredations.

Leucosticte tephrocotis littoralis. Hepburn Rosy Finch. On February 2, 1943, Williams and Jensen observed a flock of some 300 rosy finches—many of which were Hepburn—feeding on the foothills near Willard, Utah. Observation was made under favorable light conditions, at close range, and with the aid of good field glasses; there seems little chance for misidentification, but it is unfortunate that no specimens were taken.—CECIL S. WILLIAMS, G. HORTIN JENSEN, and CLARENCE COTTAM, *United States Fish and Wildlife Service, Chicago, Illinois, May 10, 1943.*

A Record of the Western Tree Sparrow in Southern California.—In the early days of ornithology in southern California, Riverside was a center of much activity. One of the vanguard of young collectors of that community was W. W. Price. His specimens became widely scattered through exchanges and a number of his "takes" have proved to have distinct significance. Notable was his record of a Yellow-green Vireo obtained in 1887 at Riverside (Price, Auk, 5, 1888:210).

Just recently come to light through the alertness of Brighton C. Cain of Oakland is a Western Tree Sparrow (*Spizella arborea ochracea*) taken by Price on February 7, 1888, at Riverside, California. The specimen presumably was brought to Oakland by Price, for he attended high school there. It was found in the collection of E. G. Mervin of that city who in 1936 gave his collection to the Oakland Boy Scouts; most of the birds were taken locally by Mr. Mervin and his brother in 1891 and 1892. Mervin told Cain that he had been greatly helped in starting his collection by Price.

The record specimen, now no. 87811 in the Museum of Vertebrate Zoology, bears a pink-stringed jeweller's label, on which is written in ink: "Riverside, Cala.," and on the opposite side, "Bells Sparrow ♀ W.W.P. 2-7-88"; the words "Bells Sparrow" are crossed out in pencil. The writing agrees well with samples of Price's handwriting of that period, especially with that on a label of a Yellow Warbler taken by him in April, 1888, at Riverside. Loye Miller, who was a schoolmate of Price's at the time, can adduce no evidence that would throw doubt on the authenticity of this specimen and its data. Identical jeweller's labels were used in that period by Price, and he would not have been expected to switch labels, although there is no absolute proof that such did not occur. Several common local species were misnamed by these young ornithologists and it is not surprising that the Tree Sparrow should have been called a Bell Sparrow.

This record is the first for the Tree Sparrow in southern California. The species has been reported six times from five localities in northern California, once as far south as Pacific Grove, Monterey County (Kimball, Condor, 24, 1922:97).—ALDEN H. MILLER, *Museum of Vertebrate Zoology, Berkeley, California, April 23, 1943.*

Fungus Disease in a Glaucous-winged Gull.—On February 15, 1943, an immature (2 year old) male Glaucous-winged Gull (*Larus glaucescens*) was obtained by Bolander on the shore of a pond near the Palace of Fine Arts in San Francisco, California. Autopsy of this bird seemed to indicate it had been dead but a few hours. The lungs exhibited extensive lesions and were hardly more than a mass of greenish, powdery fungus surrounded by an irregular thin covering of recognizable lung tissue that was only paper-thick in some places. There were also tubercular-like lesions on the liver and heart. The clavicular, cervical, axillary and thoracic air sacs did not show definite lesions but contained an abundance of the green fungus. The fungus was grown on a corn meal-agar medium and determined to be *Aspergillus fumigatus*, a common cause of mycotic pneumonia in both wild and domestic birds. Davis and McClung (Jour. Bact., 40, 1940:321-323) recently reported an outbreak of this disease in Herring Gulls about the harbor of Boston, Massachusetts, in which they estimated

a loss of 60 gulls in a flock of about 200. We were unable to obtain any other records of sick or dead gulls attributable to this infection in the San Francisco Bay area.—CARLTON M. HERMAN AND GORDON BOLANDER, *Bureau of Game Conservation, California Division of Fish and Game, San Francisco, May 18, 1943.*

Harris Sparrow in Washington.—Recently when Mr. Stanley Jewett stopped in to examine the bird skins in the collection at Walla Walla College, he discovered the skin of a Harris Sparrow (*Zonotrichia querula*) which was taken in Walla Walla County, Washington, on February 20, 1938. Mr. Jewett regards it as the first authentic record for the state.—ERNEST S. BOOTH, *Department of Biology, Walla Walla College, College Place, Washington, May 10, 1943.*

European Starling Problem in Eastern New Mexico and Adjacent Western Texas.—Previous reports of the European Starling (*Sturnus vulgaris*) in New Mexico have recorded its spreading to new localities and indicated an increasing number in the eastern part of the state (Condor, 42, 1940:86; 43, 1941:197; 44, 1942:182).

It now appears that there is a definite trend toward the building up of a large number of these birds in this area which produces sorghum for grain. During the past winter, counts were made of flocks of Starlings at intervals when they happened to be noted during investigations of cranes. The counts were as follows:

Nov. 27, 1942	—9 miles southeast of Roswell, N. M., in alfalfa field where cattle were pastured	75
30	—3 miles east of N. M. Military Institute, Roswell, N. M.	25
Dec. 8	—3 miles northeast of Roswell, N. M., where road crosses Berrendo River	50
10	—1 mile north of Dexter, N. M., mingling with Cowbirds, Red-winged Blackbirds, Brewer Blackbirds, pipits, and gulls	25
	1 mile south of Hagerman, N. M.	125
	3 miles south of Hagerman, N. M.	600
	4 miles south of Hagerman, N. M.	200
13	—just south of Lubbock, Texas	15
13	—just south of Ackerly, Texas	150
17	—5 miles east of Roswell, N. M., at Bogel farm	25
31	—2 miles north of Carlsbad, N. M.	25
Jan. 5, 1943	—1 mile north of Portales, N. M.	250
23	—3 miles south of Hagerman, N. M.	800
	Total	2,365

These counts evidently represented only a small portion of the total number of Starlings present, since no special effort was made to record the birds except while the writers were driving along the highway from Dexter to Artesia, New Mexico, on December 10. Continued increase will probably aggravate the damage wrought by blackbirds and cranes which is already being felt by the farmers.—CLARENCE A. SOOTER and LUTHER C. GOLDMAN, *United States Fish and Wildlife Service, Frenchglen, Oregon, April 20, 1943.*

NOTES AND NEWS

Fig. 40. Wilfred H. Osgood.

Fig. 41. Harry R. Painton.

Fifty years ago, on June 22, 1893, the Cooper Ornithological Club was organized in San Jose by Chester Barlow, Wilfred H. Osgood, Harry R. Painton, and Fred A. Schneider. Like a great many nascent societies, it had at the start worthy objectives and ideals but no special promise of permanent success. Swarth (A Systematic Study of the Cooper Ornithological Club, 1929:5) well pointed out, that the "nineties" were a time when California was ready for an active, unified organization of serious bird students. The wonderful avifauna of the state "had up to this time been subjected to but relatively casual and superficial observation, and no one had as yet any real insight into the complicated problem of local distribution and variation. . . . At various places in the state, however, there were ornithologists of a younger generation growing up. . . . Some of these . . . were at this time already beginning to do good work and here and there little coteries of these beginners were coming together, as a preliminary to the general crystallization that later resulted in the founding of the . . . Club." In Los Angeles in 1896, the Southern Division was formed from the Southern California Natural History Society, certain well known leaders of which were W. Lee Chambers, Howard Robertson and H. S. Swarth. Thus was established almost at the outset the dual organization of the society which has persisted to the present with admirable unity of purpose and harmonious accord. Although events of the times may naturally have favored the formation of the Club, we are convinced that its persistence and growth are attributable to a remarkable set of devoted men that saw it through its early years and developed steadily and wisely its magazine and its business organization. Not all these people can be named here, but one may say that they are typified by Barlow, Grinnell and Chambers. On this anniversary occasion we want our new members to know especially of the heritage they take over—not only the reserve of money and experience that yields them dividends, but the invaluable tradition of service freely given which has been the stout bond running through fifty years of successful activity.—A.H.M.

Mr. Oscar P. Silliman joined the Cooper Club in the first year of its existence. His death, on May 9, in Salinas removed from the Club's rolls one of its most enthusiastic members. He was born on October 1, 1876, in Watsonville, and spent nearly all of the sixty-six years of his life

Fig. 42. Chester Barlow; 1899.

Fig. 43. Fred A. Schneider.

in Monterey County, California. After 1906, Mr. Silliman made his living by operating warehouses, but always his chief interest was in the birds of California and especially of Monterey County. He spent great effort in compiling exhaustive records of the occurrence of every species known to occur in the county. His interest in the history of bird study in this area led him to assemble a remarkably complete library of bird books. This library finally came close to including every published mention of birds in California. Aside from becoming a life member of the Cooper Club, in 1937, Silliman aided bird study in the west by contributing to funds for Club publications and by employing collectors to carry on organized field exploration in Monterey County.—J.M.L.

Just as we close this editorial page, the distressing word reaches us of the death of James Moffitt who was serving as a lieutenant with the U. S. Navy in the Aleutian area.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

APRIL.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, April 22, 1943, at 8:00 p.m., in Room 2503, Life Sciences Building, Berkeley, with President Robert C. Miller in the chair and about 25 members and guests present. Because of the length of the program to follow, minutes of the Northern Division for March and of the Southern Division for February and March were read by title only. There was one proposal for membership: Miss Lola Catherine Marraccini, International House, Berkeley, California, by Alden H. Miller.

Mrs. Allen had seen Rough-winged Swallows at the south end of the Stadium, April 6 and 13, and during the following week, but thought it probable that they would not remain for nesting. She gave a number of last dates for winter visitants, including: Ruby-crowned Kinglet, March 30; Western Winter Wren, March 11-12; Townsend Warbler up to March 30 (although migrants will be likely to pass through later); Cooper Hawk, April 1; Hermit Thrush, April 13; Puget Sound White-crowned Sparrows, April 11, 13, 14; Audubon Warbler, March 23 and again April 12; and the local Fox Sparrow, April 9 (migrants likely to pass through later). Mr. Covel reported Avocets, American Egrets and two Snowy Egrets at Moss Landing, April 16.

Mr. Clarence F. Smith, Junior Biologist with the United States Fish and Wildlife Service, spoke on "Birds of the Mount Shasta Region." There has been interest in studying the relationship of seed-eating animals of the brushlands of this area to new growth of timber in chaparral areas. After forest fires, the subclimax vegetation of brush may persist for thousands of years, unless reforestation, to which the land is well suited, is carried out. Mr. Smith presented an annotated list of the many birds he has observed in the region and illustrated the ecological conditions with Kodachrome slides.

An especially fortunate circumstance was the

presence of two guests well known to many members personally and by name to all who have enjoyed nature photography, William and Irene Finley. Some of their most recent Kodachrome slides, showing birds and flowers of Arizona, made a fitting climax to a full evening of enjoyment.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

MAY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, May 27, 1943, at 8:00 p.m., in Room 2503, Life Sciences Building, University of California, Berkeley, with President Robert C. Miller in the chair and more than 100 members and guests present. Minutes of the Northern Division for April were read and approved. There was one proposal for membership: (Mr.) Kai R. Martensen, 2131 Spaulding Street, Berkeley, California, by Frances Carter.

Mrs. Allen said that the Rough-winged Swallows which she had reported at the south end of the Stadium during mid-April were still present, apparently nesting, although she had not located the exact site. As late as May 18, she had seen a Fox Sparrow at Codornices Creek in Berkeley. Miss Crowe described a flight of Turkey Vultures in San Francisco, on Post Street west of Fell Street, May 1.

The speaker of the evening was Mr. Charles A. Harwell, California Representative of the National Association of Audubon Societies; his subject, "Birds of the California Deserts." As a special feature, Mr. Harwell described, with the aid of musical notation, the songs of five species of thrashers: Bendire, Crissal, Leconte, Sage and California.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

SOUTHERN DIVISION

APRIL.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, April 27, 1943, at 8:00 p.m., in Room 145, Allan Hancock Foundation, Los Angeles, California, with Dr. I. D. Nokes presiding and 62 members and guests present. Minutes of the preceding meeting were read and approved. Application for membership of the following were read: Dr. C. H. Luther, East Center St., Fayetteville, Arkansas, proposed by W. Lee Chambers; Henry G. Weston, Jr., 476 C St., Coronado, California, proposed by Ken W. Stott, Jr.; and H. Paul Keiser, Big Dalton Dam, Glendora, California, proposed by S. D. Platford.

Reports of field observations centered principally on the Burrowing Owl. Dr. I. D. Nokes reported a pair nesting in a drain pipe at his residence, while Miss Frances Cramer reported one roosting in a similar pipe at her home, both in Los Angeles.

The club enjoyed an illustrated talk by Charles A. Harwell on the subject, "Birds of the Desert."

Adjourned.—WALTER W. BENNETT, *Secretary.*

MAY.—The annual All Day Field Meeting of the Southern Division of the Cooper Ornithological Club was held Sunday, May 9, 1943, at Tapia Park in the Malibu Mountains 35 miles northwest of Los Angeles, with 65 members and guests present.

At the afternoon business session, minutes of the April meeting were approved and application for membership of George Marion Riddick, 600 Weatherly Building, Portland, Oregon, proposed by Stanley G. Jewett, was read.

Mr. George Willett reported the passing of Mrs. A. J. van Rossem during the preceding week and the secretary was instructed to send condolences to her husband.

Mr. W. Lee Chambers described a recent incident in which an Ash-throated Flycatcher entered the nest of a Western Bluebird while it was occupied by the female; the intruder was chased down a long canyon with unusual ferocity. Mr. George Willett noted casualties among White Pelicans due to salt water. The superintendent of a salt company at Saltdale, in the Mohave Desert, recently saw condensed salt water at his plant blow over the birds and quickly dry so that they could not fly; all died. Howard Robertson reported seeing a Condor flying over the city of Los Angeles in the third week of last March. W. Lee Chambers reported four seen in Tapia Park in early April.

Mr. W. Lee Chambers offered the following resolution signed by H. W. Carriger, J. R. Pemberton, Alden H. Miller, George Willett and himself:

Whereas, Howard Robertson, President of the Board of Directors of the Cooper Ornithological Club, has, since 1896, been an active member of the organization and had a large part in the establishment of its Southern Division, and

Whereas, he has served in maintaining the beneficial connection of the Club with the Los Angeles Museum of History, Science, and Art, and

Whereas, he has conducted the legal business of our organization, carrying to completion in 1934 its incorporation,

Therefore, we, the undersigned, propose that Howard Robertson be elected an honorary member of the Club.

In accordance with the By-laws the foregoing was laid over for one month.

It was moved and carried that the Secretary express appreciation of the Club to Spence Turner, Los Angeles County Forester and Fire Warden, and to L. P. Sheldon for use of Tapia Park for the meeting.

Adjourned.—WALTER W. BENNETT, *Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN McB. ROBERTSON, Buena Park, California.

BIRD REFERENCE work of any kind done at the U. S. National Museum for distant ornithologists. I have full access to the collections and library. Terms: 50 cents per hour. Address: DR. E. M. HASBROUCK, *U. S. National Museum, Washington, D. C.*

FOR SALE—Scientific Publications on Natural History, Zoology, Botany, Geology, Paleontology, Ethnology, Anthropology, Archeology. Publications of Government, States, Universities, and Societies, including foreign.—F. N. BASSETT, *722 N. Orange Drive, Los Angeles, Calif.*

FOR SALE—Wyman and Burnell's "Field Book of the Birds of the Southwestern United States," with colored plate and numerous distribution maps. Published in 1925; is still one of the best bird books of the region. A few new copies with dust wrappers, $2.00 postpaid; it was published at $3.50. —W. LEE CHAMBERS, *Robinson Road, Topanga, California.*

FOR SALE—Bird song recordings by the late Albert Brand and A. A. Allen of Cornell University are unusually satisfactory to students of bird song; pleasureable and educative. Seventy-two North American species on six standard ten-inch records, including forty-five representative western species. Set in album $6.00; California special, nos. 2, 4 and 6, $3.50; singles $1.25; plus sales tax in California. A discount of 20 per cent for twelve records to one address. Descriptive folder on request.—NATURE STOREHOUSE, ROLAND C. ROSS, *1820 Bushnell Ave., South Pasadena, California.*

WANTED—A new or used copy of "Birds of Guerrero, Mexico," by Ludlow Griscom; also a copy of Blake's paper on the birds of Michoacan.—MILTON S. RAY, *2901 Broadway, San Francisco, California.*

ANNOUNCEMENT OF POSITION

The location of war industries and the numerous war restrictions have retarded and handicapped efforts in the past two years to establish a biological laboratory and research station that would also be the repository of the Bailey collections and library. Accordingly, another excellent and natural site was purchased last summer: the old and well known (though deteriorated) Rockbridge-Alum Springs property, comprising some 1516 acres of meadow, woodland, mountain stream, pure water springs, and the famous medicinal springs.

The acreage is in the mountains of Virginia, at 2000 feet altitude, and is approximately three-fourths surrounded by the George Washington-Jefferson National Forests. It is 18 miles from either Lexington or Clifton Forge, and 6 miles and 9 miles, respectively, from Millboro and Goshen on the main line of the Chesapeake and Ohio Railroad. Reconstruction of several of the old brick buildings has been completed, and we are going ahead with such work as can be carried on, looking forward to the future successful establishment of our project.

We now want, and need, some man interested in natural history, married and not subject to draft, who will live on our place and cooperate with us in making it a wildlife preserve. There will be a salary, living quarters, and other perquisites for any one who joins us. Do not apply unless you have a keen and sincere interest in natural history.

HAROLD H. and LAURA L. BAILEY
Route 2, Goshen
Virginia